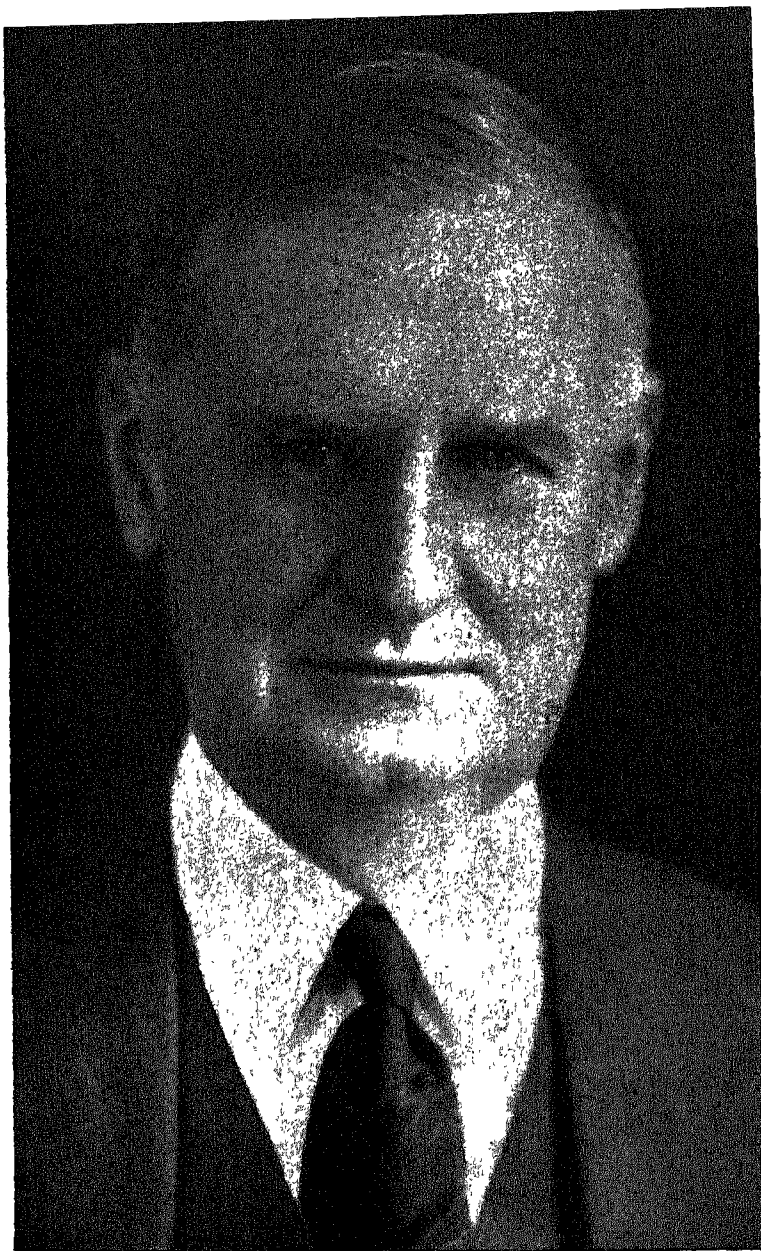


I will work hard, not and
live up to the best that is in me.
I will blot out of my life the
failures that come through wast-
ed hours, and write into it the
achievements that come through
time well spent.





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1958

AMERICAN TECHNICAL SOCIETY
CHICAGO, U. S. A.

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Printed in U. S. A.

AUTHORS AND COLLABORATORS

BERNARD F. BAKER, B.S.

Supervisor of Vocational Business Education, Chicago Public Schools
Author of *Effective Retail Selling*
Formerly Instructor in Business, Englewood High School, Chicago

HARRY A. BATES

Retired Former Vice-President, Reincke-Ellis-Younggreen and Finn, Inc.,
Advertising Agency, Chicago

ROWLAND BURNSTAN, Ph.D., Sc.D.

President, Indian Motorcycle Company
Formerly Professor of Economics and Chairman of the Department, Carleton College
Formerly Director of Research, Armour & Company
Formerly Economist, United States Department of Commerce
Formerly Associate Editor, *Survey of Current Business*

JOHN A. CHAMBERLAIN, A.B., LL.B.

Attorney, Cleveland, Ohio
Formerly Lecturer on Suretyship, Western Reserve Law School
Author of *Principles of Business Law*
Contributor to Law Journals

JAY F. CHRIST, A.B., J.D.

Associate Professor of Business Law, School of Business, The University of Chicago
Author of *Fundamental Business Law, Elements of Commercial Law, Modern Business Law, Law of Contracts and Sales*
Formerly Associate Editor of *Legal Periodical Digest*
Formerly Director and Chief of Radio Code Instruction, U.S. Naval Training School (Radio) at The University of Chicago
Co-author of *Outlines of Economic Order*

RAYMOND V. CRADIT, B.S., M.A.

Member, Missouri and Florida Bars
Formerly Professor of Commerce, Northeastern Oklahoma State Teachers College
Financial Analyst, U.S. Signal Corps Price Adjustment Section, Chicago
Author of *Business Organization, Office Management, Bookkeeping for Personal and Business Use*

HENRY POST DUTTON, B.E.E.

Chairman, Department of Industrial Engineering, and Professor of Business Management, Illinois Institute of Technology
Formerly Professor of Factory Management, Northwestern University
Consultant in Management

L. E. FRAILEY, B.A.

Lecturer, Author, and Business Letter Counselor
Sales Consultant, National Association of Real Estate Boards
Formerly Instructor in Business Letters, Northwestern University
Formerly Editorial Director, The Dartnell Corporation
Formerly Personnel Director, Purina Mills

GEORGE E. FRAZER, LL.B., C.P.A.

Member of the Firm of Frazer and Torbet, Certified Public Accountants
Formerly General Auditor, Montgomery Ward & Company, Chicago
Formerly Lecturer in Accounting and Finance, The University of Chicago

AUTHORS AND COLLABORATORS—CONTINUED

WILLARD J. GRAHAM, A.M., Ph.D., C.P.A.

Professor of Accounting, School of Business, and Director of Business Studies
in University College, The University of Chicago
Associate, American Institute of Accountants

GLENN M. HOBBS, B.S. Ph.D.

With W. M. Welch Manufacturing Company
Formerly Executive Director, University of Illinois Foundation
Fellow, American Association for Advancement of Science

JAMES MCKINNEY

President, American School, Chicago
Vice-President, American Technical Society
Formerly Field Director, Education and Training Section, Emergency
Fleet Corporation
Formerly Assistant Professor of Industrial Education, University of Illinois

JAMES O. MCKINSEY, A.M., LL.B., C.P.A.

Author of *Budgetary Control, Managerial Accounting, Financial Management*
Late Former Professor of Business Policies, The University of Chicago
Late Former Chairman of the Board of Directors, Marshall Field and Company

THOMAS C. ROBINSON, B.S.

Agricultural Statistician, Bureau of Agricultural Economics, U.S. Department
of Agriculture
Author of *Practical Statistics*

EARL A. SALIERS, B.S., A.M., Ph.D., C.P.A.

Professor of Accounting and Head of the Accounting Department, Louisiana
State University
Member of American Accounting Association and the American Institute of
Accountants
Author of *Principles of Depreciation, Financial Statements Made Plain,*
Accounts in Theory and in Practice, Handbook of Corporate Management
and Procedure, Modern Practical Accounting

JOHN L. SCOTT

Director of Advertising, G. D. Searle & Company, Chicago
Formerly Editor of *The Printing Art Quarterly*
Formerly Managing Editor of *American Business*

A. M. SIMONS, B.L.

With Bureau of Medical Economics, American Medical Association
Formerly Lecturer on Personnel Relations, University of Wisconsin
Author of *Personnel Relations in Industry, Production Management*

MAY WOOD-SIMONS, Ph.B., M.A., Ph.D.

Author of the *Wisconsin Citizens Handbook, Everyday Problems*
in Economics, Woman and the Social Problem
Formerly Instructor of Economics, Northwestern University
Member, American Economics Association and the Royal Economical Society
(Britain)

LUCIUS I. WIGHTMAN, E.E., M.E.

Industrial Counsel for Advertising, Sales Distribution, Products, Product Design,
and Markets, at Gales Ferry, Connecticut
Formerly Advertising Manager, Ingersoll-Rand Company

AUTHORITIES CONSULTED

THE editors have freely consulted the standard technical and business literature of America in the preparation of these volumes. They desire to express their indebtedness particularly to the following eminent authorities, whose well-known treatises should be in the library of everyone interested in modern business methods.

Grateful acknowledgment is made of the valuable service rendered by the many manufacturers and specialists in office and factory methods, whose cooperation has made it possible to include in these volumes suitable illustrations of the latest equipment for office use. Acknowledgment is also made to those financial, mercantile, and manufacturing concerns who have supplied illustrations of offices, factories, and shops, typical of the commercial and industrial life of America.

ROGER WARD BABSON, B.S., LL.D.

Chairman of the Board, Babson's Reports, Inc.
Founder, Babson's Statistical Organization and Babson Institute
Author of *Twenty Ways to Save Money*, *Consumer Protection*, *Business Barometers*, *Business and Investing Fundamentals*

ROBERT JOSEPH BENNETT, C.P.A.

Author of *Corporation Organization and Accounting*
Co-author of *Corporation Procedure*

WILLARD COPE BRINTON, S.B.

President and Treasurer, Terminal Engineering Company, Lawrence Safety Brake Company, New York
Author of *Graphic Presentation*, *Graphic Methods for Presenting Facts*
Member of American Society of Mechanical Engineers, American Statistical Society, Harvard Engineering Society of New York

STUART CHASE, S.B.

Author of *Where Does the Money Come From? A Primer of Economics*, *Idle Money, Idle Men*, *Economy of Abundance, Men and Machines*
Formerly with the Securities and Exchange Commission and the Tennessee Valley Authority

PAUL DELANEY CONVERSE, A.M.

Professor of Business Organization and Operation, University of Illinois
Author of *Elements of Marketing*

AUTHORITIES CONSULTED—CONTINUED

ARTHUR STONE DEWING, A.M., Ph.D.

President, White Mountain Water Company, Portland Water Company, Jewett City Water Company, Chatham Water Company, Hazardville Water Company
Author of *The Corporation—A Study of Its Financial Structure*,
Corporation Finance, Financial Policy of Corporations
Director of Consolidated Biscuit Company, Barnstable Water Company

EDWARD A. DUDDY, A.M.

Professor of Marketing, School of Business, The University of Chicago
Author of *Business Correspondence, Materials for the Study of Business*

PAUL HOWARD DOUGLAS, A.M., Ph.D.

Professor of Industrial Relations, The University of Chicago
Author of *The Theory of Wages, Controlling Depressions, Social Security in the United States, Real Wages in the United States*
Member of American Economic Association, American Statistical Association

HARRY ANSON FINNEY, Ph.B., C.P.A.

Member of the Firm of Baumann, Finney & Co., Chicago
Professor of Accounting, Northwestern University
Author of *General Accounting, Introduction to Principles of Accounting, Consolidated Statements, Principles of Accounting*
Member of American Institute of Accountants

IRVING FISHER, Ph.D.

Former Professor of Political Economy, Yale University
Director and Member of Executive Committee, Remington Rand, Incorporated
Author of *Booms and Depressions, Stable Money, a History of the Movement, Stabilizing the Dollar, The Making of Index Numbers, The Theory of Interest*

CHARLES W. GERSTENBERG, LL.B., J.D.

Professor of Constitutional Law, St. Lawrence University
Author of *American Constitutional Law, Financial Organization and Management*
Member of American Economic Association, American Statistical Association

FRANK BUNKER GILBRETH

Author of *Fatigue Study*
Formerly Consulting Management Engineer
Member of American Society of Mechanical Engineers

GEORGE CARTER HARRISON

Fellow, Institute of Management
Author of *Standard Costs, Cost Accounting to Aid Production*

JOHN THOM. HOLDSWORTH, A.B., Ph.D.

Professor of Economics, University of Miami
Member, American Economic Association
Author of *Money and Banking*

ROY BERNARD KESTER, M.A., Ph.D., C.P.A.

Professor of Accounting, School of Business, Columbia University
Author of *Principles of Accounting, Accounting Applications in Business and Industry, Accounting Theory and Practice*
Member of American Institute of Accountants, National Association of Cost Accountants, American Accounting Association

AUTHORITIES CONSULTED—CONTINUED

FORREST A. KINGSBURY, Ph.D.

Associate Professor of Psychology and Student Counselor, The University
of Chicago
Co-author of *Psychological Tests in Business*

LEVERETT S. LYON, LL.B., M.A., Ph.D.

Chief Executive Officer, Chicago Association of Commerce
Member, American Economic Association, Academy of Political Science, and
American Statistical Association
Author of *Education for Business, Salesmen in Marketing Strategy,*
Advertising Allowances, Government and Economic Life

LEON CARROLL MARSHALL, A.M., LL.D.

Professor of Political Economy, American University
Formerly Visiting Professor of Education, Johns Hopkins University
Associate Editor, *Journal of Political Economy*
Author of *Curriculum Making in the Social Studies, Readings in Industrial*
Society, Business Administration, The National Recovery Administration—
An Analysis and Appraisal

WESLEY CLAIR MITCHELL, Ph.D., LL.D., D.Sc.

Professor of Economics, Columbia University
Past President, American Economic Association
Fellow, American Statistical Association
Author of *Business Cycles: The Problem and Its Setting, The Backward*
Art of Spending Money, A History of the Greenbacks
Co-author of *Recent Economic Changes, Income in the United States*

ROBERT H. MONTGOMERY, LL.D., C.P.A.

Member of the Firm of Lybrand, Ross Bros. & Montgomery
Formerly Member of Board, School of Business, Columbia University
Author of *Excess Profits and Other Federal Taxes on Corporations,*
Federal Tax Handbook Supplement, Income Tax Procedure
Past President of American Association of Accountants
Member of American Economic Association and American Institute of Accountants

HAROLD GLENN MOULTON, LL.D., Ph.D.

President of the Brookings Institution, Washington, D. C.
Author of *Capital Expansion, Employment, and Economic Stability, The Recovery*
Problem in the United States, The Financial Organization of Society

PAUL HENRY NYSTROM, Ph.B., Ph.M., Ph.D.

Professor of Marketing, Columbia University
Consultant in Business and Marketing
Past President of the American Marketing Society
Author of *Retail Store Operation, The Economics of Consumption,*
Economics of Retailing

WILLIAM ANDREW PATON, A.M., Ph.D., C.P.A.

Professor of Economics and Accounting, University of Michigan
Member, American Economic Association, Society of Certified Public Accountants,
American Institute of Accountants
Editor and Principal Contributor, *Accountant's Handbook*
Author of *An Introduction to Corporate Accounting Standards, Advanced*
Accounting, Accounting Theory

AUTHORITIES CONSULTED—CONTINUED

WARREN MILTON PERSONS, B.S.

Member of the Firm of Warren M. Persons and Associates, Consultants in
Applied Economics, New York
Fellow, American Statistical Association, Member, American Economic
Association
Author of *The Construction of Index Numbers, Forecasting Business Conditions,*
Indices of Business Conditions

ROSCOE POUND, A.M., Ph.D., LL.M., LL.D., J.U.D.

Formerly Carter Professor of Jurisprudence, Harvard University
Fellow, American Association for Advancement of Science, American Bar Association
Author of *Appellate Procedure in Civil Cases, Law and Morals,*
Administrative Law, The Spirit of the Common Law

H. W. QUAINANCE, LL.B., Ph.D.

Formerly Head of the Department of Accounting and Business Administration,
American School

CLARENCE RUFUS ROREM, A.M., Ph.D., C.P.A., LL.D.

Chairman, Committee on Welfare Accounting, American Public Welfare Association
Consultant to Federal Security Board
Director of Committee on Hospital Service, American Hospital Association, Chicago
Member, American Economic Association
Author of *Accounting Method, Hospital Care in the Family Budget*

WALTER DILL SCOTT, LL.D., Ph.D.

President Emeritus of Northwestern University
Author of *Influencing Men in Business, Increasing Human Efficiency in Business,*
Psychology of Advertising in Theory and Practice, Personnel Management

WILLIAM HOMER SPENCER, Ph.B., J.D.

Professor of Government and Business, The University of Chicago
Author of *Casebook of Law and Business, A Textbook on Law and*
Business, Law and Business, The National Labor Relations Act

FREDERICK WINSLOW TAYLOR, M.E., Sc.D.

Past President of the American Society of Mechanical Engineers
Author of *Shop Management, Scientific Management in American Industry,*
The Principles of Scientific Management

ORDWAY TEAD, A.B.

Editor of Economic and Business Books, Harper & Bros., Director, Harper & Bros.
Member of the American Economic Association, Association for Labor-Legislation
Author of *New Adventures in Democracy, Human Nature and Management*

PAUL M. WARBURG

Formerly Member, Federal Reserve Board

H. PARKER WILLIS, Ph.D., LL.D.

Professor of Banking, Columbia University
Formerly Editor-in-Chief, *New York Journal of Commerce*
Author of *The Federal Reserve System*
Co-Author of *Foreign Banking Systems, Investment Banking, Federal Reserve*
Banking Practice

FOREWORD

MODERN business places a high premium on the trained man. Of the thousands who knock each year at the portals of our commercial enterprises, the applicant with a backlog of sound training is in greatest demand.

On the job, he has a better chance for promotion than the untrained worker, because his preparation gives him a knowledge of the broad fundamentals of successful business operation.

The road to executive leadership and success in business begins with good training. All commercial and business enterprises, large and small, are governed by certain basic principles. Today's businessman must analyze his problems with intelligence and knowledge, based on an intimate understanding of these fundamentals. He must have a grasp of the whole operation of a business as well as the inter-relation of its parts.

How does he come into possession of such knowledge? Eventually by experience, yes. But he seldom gets the chance to acquire that experience without previous preparation. Such preparation can come either through study or apprenticeship, but usually it is a combination of both.

However, the great growth of business and industry, reaching new heights of expansion during World War II, has made for further specialization in the duties of business executives and subordinates. Thus it has become impossible to get apprentice experience in the numerous departments of an organization without spending long years.

Modern methods of business training have evolved sound and tested short cuts to executive leadership and business independence. A carefully planned program of study offers effective means of acquiring such training.

In the past, the man who desired to acquire this knowledge found himself wasting valuable time. For one thing, good reading material was so scattered that blind selection of textbooks was unavoidable. As a result, much duplication of

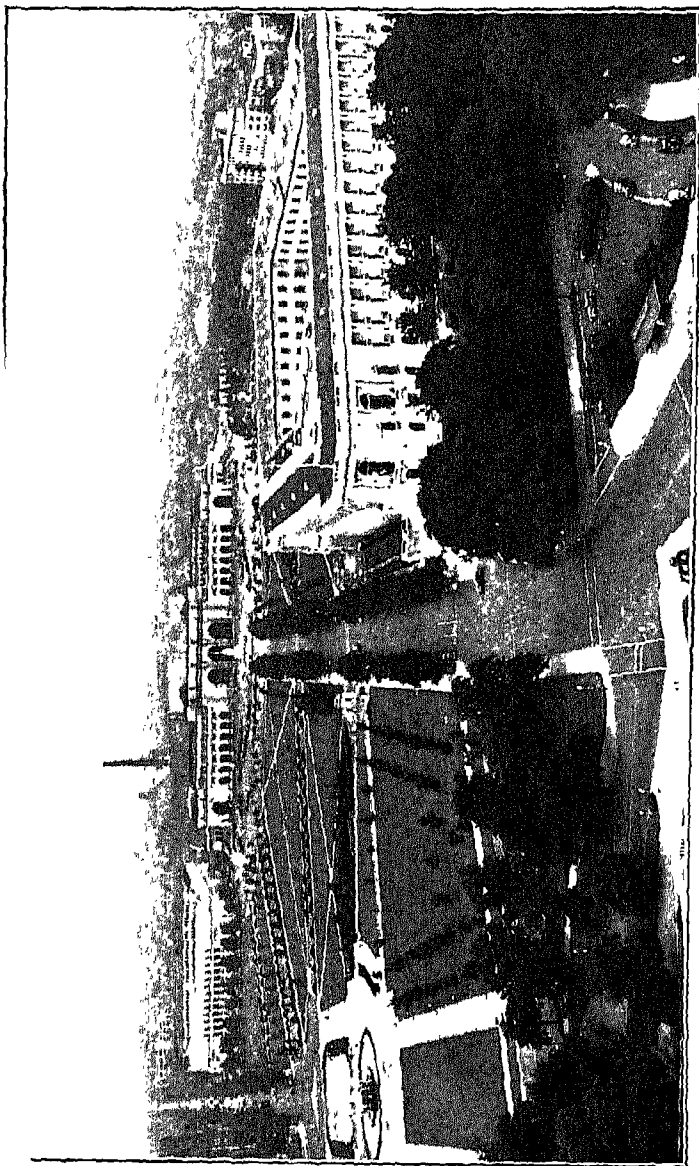
reading and important omissions gave him too much of some subjects and too little of others.

In order to offer in co-ordinated, organized form, a complete series on training for business leadership, the American Technical Society prepared this set on Practical Business Administration. Through eight editions and numerous re-printings, we have revised and added to the original texts to meet the specific needs of today's business trainee and executive.

The present set combines the collective judgment of outstanding authorities with their accumulated years of practical experience in specialized fields. Thousands already have found this set to be their first step toward successful business careers.

Prepared primarily for those who engage in independent home study, these books have been written at the college level for high-school graduates who aspire to executive positions. The style of writing is simple and readable; the lesson contents clear and comprehensive.

The businessman hard pressed for time, the fact-seeking citizen wanting the know-how of business, and the student for whom this set has been prepared primarily—all find in these books a wide range of practical knowledge and a wealth of factual material about the world of business.



UNITED STATES CAPITOL PLAZA
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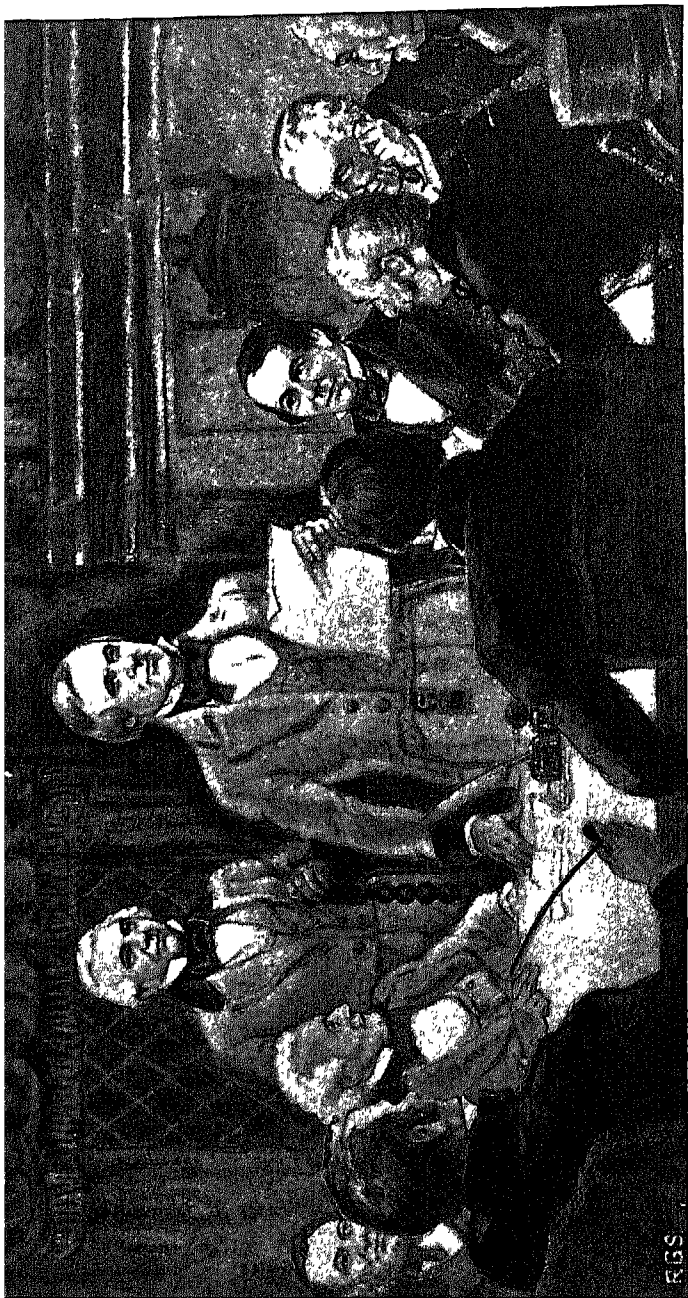
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AN IDEA THAT GREW WITH FINANCIAL MANAGEMENT

Great business and industrial organizations have started with not much more than an idea and have grown with sound financial management. A century ago a group of enterprising businessmen in a small New England town held a meeting. They wanted to work out a plan by which, through pooling their resources, they could guarantee their widows and children the financial protection which alone, as individuals, they could not provide. They thereby founded one of the country's oldest life insurance companies.

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Financial Management

Part II

V. Control of Disbursements of Capital

Chapter XX

Factors Involved in Control

186. Need for control of disbursements

In making the financial program it is necessary: (1) to determine in advance the volume of capital required by the business; (2) to determine the source from which the capital is to be secured; and (3) to determine the method which is to be employed in obtaining the capital desired.

If it is assumed that, as a result of the foregoing steps, capital has been secured for given purposes, it is in order next to explain how control may be exercised over its use in order to insure its use for the purposes for which it was secured.

Usually a business has made estimates of the capital required for various purposes and then combined these estimates to determine the amount which must be secured. This amount may have been secured in one or in several sums depending on whether all the funds required were derived from one or from several sources. It is now necessary to institute some control over the use of funds; otherwise, too much of the total may be used for some purposes and there may not be enough for the other purposes. For instance, if the advertising depart-

ment is expending \$100,000 more than its estimates call for, other departments are going to have insufficient funds to meet their estimated expenditures. It is necessary, therefore, that all expenditures be controlled. Such control can be exercised only by means of a definite appropriation for each purpose and the preparation of reports which will make it possible to check that the appropriations are not exceeded except when a satisfactory reason can be given, and then only after executive permission has been obtained.

In presenting the method of controlling disbursements, it will be necessary to explain:

1. The control of the initial expenditures of a business at the time of its formation
2. The control of the current expenditures of a business during its operation

187. Control of initial expenditures

It is necessary to have very definite plans and estimates made at the time a new company is organized. All those who have had experience in the organization of a new business know that the initial expenditures have an unfortunate tendency to become much higher than originally expected. Such excess expenditures may originate due in part to the fact that no definite estimates of costs have been made; consequently no definite control can be exercised.

For two reasons it is desirable that careful estimates of the initial costs be made:

1. Careful estimates make it possible to formulate a well-rounded plan of financing the business; and the necessary amount of capital can be provided for in advance. This eliminates the difficulties that arise in cases where the original plans were not carefully drawn and additional

funds have to be obtained. It may be much more expensive to obtain these additional funds after the organization is in operation than to secure them at the beginning. It may cause delay in carrying out plans, and losses may result. This in time may excite the suspicion and misgivings of those who are supplying the funds and cause them to lose confidence in the executive heads of the business. If the stockholders are told that \$250,000 is required as the original investment in the business, they may be willing to supply this; but if they are told at first that \$200,000 is sufficient and are later informed that \$50,000 additional must be provided, they may hesitate to supply the additional amount.

2. Careful estimates make control of expenditures possible. If the cost of any particular phase of the organization has not been determined in advance, it is difficult to state that the amount actually expended is too large. If, however, calculations of costs are available, an effective check is possible. For instance, a manufacturing concern may plan to construct a new plant at the time of its organization. If an accurate estimate of costs is made as a part of the preliminary plans, sufficient capital can be secured to construct the new plant; and when it is being constructed, the expenditures made can be constantly checked against the previous estimates and excessive expenditures thereby prevented. In the case of expenses of a more intangible nature, such as organization expenses, overhead expenses, etc., control is even more important. Such expenses are more likely to become excessive than are those of any other kind.

It is impossible to estimate all the expenditures of an organization exactly; but, if proper care is exercised, they can be estimated approximately. The importance of the problem is sufficient to warrant that it be solved as accurately as possible regardless of its difficulty. The organizers of a company of considerable size will often need to employ the assistance of experts in order to make proper estimates; such services may be costly, but the saving resulting therefrom may more than repay the original cost.

After such estimates are made, it is necessary to prepare frequent reports which will make it possible to compare the estimates and the actual expenditures. Expenditures should not exceed the estimates without executive permission, and such permission should not be granted without cause.

188. Control of disbursements for operation

After funds required in the organization of a business have been spent according to estimates, it becomes necessary to expend funds for its operation. These two kinds of expenditures have been separated arbitrarily for this discussion. They are not supposed to be independent of each other. It is evident that, at the same time when plans are being made for initial capital, plans should be made also for the funds required to finance the operation of the organization. Sufficient funds to operate the plant according to the original plans constitute part of the initial capital requirements. In other words, it is necessary to estimate the volume of operations and its costs in order to determine initial capital requirements. Then as the business develops, it may become necessary to determine the additional capital requirements needed in order to meet the changing conditions. It is necessary to control the expenditure of these funds, period by period, as the operations continue. This control is possible only when based on estimates and on reports which make possible a control of the estimates.

To conclude: control of disbursements must be predicated on a system of budgetary control; and budgetary control is dependent on a well-formulated program for the business as a whole. Such a program results from a co-ordination of the programs of the major activities.

189. The sales program

A sales program is based on an estimate of the sales desired and deemed possible. If such an estimate constitutes a part of the general budgetary plans of the business, it is necessary to see how control may be exercised over the expenditures to be made in the execution of those plans. It should be evident that the present discussion can only outline the methods employed for purposes of control. It cannot supply all the details. Details will vary according to the nature and organization of each particular business.

Financing credit sales—In most businesses sales are made on account, and consequently a certain amount of the capital of the firm is constantly tied up in accounts receivable. In making financial plans for such businesses, it will be necessary to determine the amount of capital required to finance the credit to be granted under the anticipated sales program. After the amount of credit to be granted is determined, it will be necessary to have frequent reports which will make possible a comparison between the estimated amount of accounts receivable and the actual amount. The method of exercising control over the quality of the credit given will be discussed in considerable detail in later chapters.

After credit has been granted, the collection of accounts involves invariably certain expenses. Such expenses should be estimated in advance and the amount should be controlled by means of reports.

Financing selling costs—Expenses inevitably arise in securing sales. Selling expenses are of various kinds, depending on the nature of the business and the method employed in marketing its goods. There are, however, certain expenses which are incurred by every business.

One of the first of these is advertising. In most businesses, the cost of advertising is quite an important expense factor. The advertising program for each budget period should be made well in advance of the beginning of the period. Contracts for advertising in the principal mediums should be made in advance, and a careful estimate should be made for miscellaneous advertising. From the contracts let and the estimates made, the total cost of advertising for the period can be determined and this information will aid in making the financial plans of the business. It will then be necessary to have reports made monthly in order to afford a comparison between the estimated and the actual expenditures for the month. If revisions of the original estimates are made, these should be indicated, so that the financial executive can change his plans accordingly. Correct estimates for advertising and proper adherence to these estimates are the very basis for correct sales price calculation.

In the same manner, other sales expenses, including salesmen's salaries or commissions, travelling expense, sales office expense, and all other expenses for which the sales department is responsible should be estimated in advance; and a budget should be prepared to cover them. Then monthly reports are to be required by means of which it will be possible to control such expense by limiting them to the amount of the original estimate, except as that estimate may be revised by permission of the chief executive. If such revisions are made, they must be indicated on the monthly reports so that the financial budget may be changed accordingly. Sometimes it is impossible to make an estimate of all the petty expenses which may be incurred by the sales department. In this case it may be desirable to have a contingency fund included in the

sales expense budget against which such items may be charged. It is needless to say that such a fund should not be large in amount and that its use should be effectually controlled.

In most businesses some goods sold are returned by the purchasers and some claims for deductions from the invoice price of goods are made and allowed. Returning the goods incurs some expense, and, since it is returned, the amount to be received from sales is reduced. It is important that the amount of sales returns be considered in making the financial budget. It is important that regular reports be made which will show not only the amounts of such returns but also the cause, so that, if possible, the cause may be eliminated. This involves an analysis of the sales returns in order to determine the cause of returns. Sales deductions decrease the returns from sales and must, therefore, be considered in making the financial budget. Reports similar to those suggested in connection with sales returns should be made at frequent intervals, preferably monthly.

190. Purchases and production

A proper conservation of the capital of a business requires a correlation of the sales and production programs. This correlation can be brought about only by the use of reports which will make possible a comparison between demand as reflected in the sales program and supply as reflected in the production program. After the sales program is made, it is necessary to buy or to produce the goods which are to be sold. For managerial purposes, it is necessary to determine the quantity to be bought or produced in order that this quantity may be secured and made available to meet the sales orders. For the purpose

of the financial program, it is necessary that the cost of the goods to be purchased or produced be predetermined in order that proper action may be taken to secure the necessary funds. From the viewpoint of the present discussion, we are interested primarily in the control of the disbursement of these funds. In order to exercise such control it is necessary to estimate the amount of the expense and then to have a comparison made between the estimated and the actual costs. These estimates and reports must be made by classes rather than by totals. It will be necessary to notice some of the principal classes of expense items both when the finished goods are bought and when they are produced.

Financing purchases—When the finished product is purchased, there are two principal items of cost: (1) the expense incurred by the buying department in connection with its purchase; and (2) cost of goods.

The total cost of purchases for the budget period should be estimated prior to the beginning of the period. Throughout the period there should be reports which will afford comparisons between the estimated and the actual cost of goods. Each of these reports should be compared with the estimated sales and with the actual sales; for, if the sales program is revised, a corresponding revision in the purchasing program should be made, if possible. After commitments have been made, such revisions may not be possible. Revisions in the purchase estimates must be communicated to the financial executive, so that corresponding revisions may be made in the financial budget.

As for the cost of the goods purchased, there should be also estimates and reports to cover the buying expense.

These reports should provide for comparisons between the estimated and the actual expense and for such revision in the light of the latter as may be necessary. The revisions must be reported to the financial department so that any needed changes can be made in the financial budget.

Financing production—Production costs consist chiefly of three items: materials, labor, and expense incurred in connection with these two items. Each of these items must be treated separately for the purpose of controlling the related expenditures, and each item should be subdivided as far as is feasible. The general plan of exercising control over these disbursements is so similar to that explained in connection with the various other disbursements which have been discussed that it is not necessary to discuss this plan in detail. Control involves the making of estimates and the securing of reports. This will make it possible to compare estimates with actual disbursements, to revise the estimates in the light of the changing conditions, and, finally, to revise the financial budget in accordance with the revision in the production program. There are many problems involved in the formulation and execution of the production program, but these are problems of production management.

191. Control of disbursements for plant and equipment

After the initial cost of plant and equipment has been provided for, and after adequate capital for the operation of the enterprise has been secured, there are two other kinds of expenditures necessarily incurred in

connection with plant and equipment: (1) expenditures for maintenance of present equipment; and (2) expenditures for additional plant and equipment. The amount of such expenditures is dependent to a considerable extent on the general budgetary plans of the business, although some maintenance expense is by no means proportional to the volume of production. The problems involved in exercising control over disbursements for maintenance and for purchase of additional plant and equipment are deemed of sufficient importance to require further discussion in the chapters immediately following.

192. Control of overhead and sundry expenses

In the previous discussion there has been an attempt to point out, in a brief way, the method of controlling the disbursements which are necessary in carrying out the sales and production programs of the business. No attempt has been made to discuss the control of these disbursements in an exhaustive way, for such control is to a considerable extent a problem both of the sales department and of the production department. This discussion merely seeks to show the relation of such control to the problem of financial management.

In the execution of the sales and production programs, it is not only necessary to have plant and equipment, but it is necessary also that certain administrative work be done in the supervision and correlation of sales and production and in the conduct of the plant and equipment. Such administrative work requires a certain personnel, and this in turn requires expenditures for services and for such room and facilities as may be needful for the performance of that service. In addition to the expenses incurred in the administration of the busi-

ness, there are sundry expenses incurred in carrying on the various subordinate activities of the business. It will be necessary therefore to discuss the method of controlling expenditures for overhead and sundry expenses. This has been touched upon in Chapter V from the point of view of economy but not from the point of its correlation with the financial budget.

Chapter XXI

Control over Disbursements for Maintenance of Plant and Equipment

193. Need for consideration

In every business there is need for certain equipment to be used in its conduct. The amount and nature of this equipment depend upon the size and nature of the operations of each particular business. A professional firm needs little equipment and very rarely owns the building in which it is housed. A mercantile firm uses a limited amount of equipment, according to its size, and, in many cases, does not own the building in which it operates. A manufacturing firm usually employs a large amount of equipment and, in most cases, owns its plant. Consequently a large part of the capital of a manufacturing firm is invested in its plant and equipment.

It can be seen, therefore, that while expenditures for plant and equipment are most important in connection with industrial concerns, they are of some significance in all businesses.

194. Classification of plant and equipment expenditures

Expenditures made in connection with the plant and equipment of a business may be classified as follows:

1. Expenditures which are necessary in order to maintain the present plant and equipment at its normal efficiency. (No matter how carefully equipment may be selected or how carefully it may be used, certain expenditures must be made from time to time in order to keep it in such condition that it can be operated efficiently. Such expenditures are called "repairs.")

2. Expenditures which are made in order to provide new equipment to replace old equipment that is worn out and discarded. (Regardless of the amount spent in the way of repairs, equipment will, in time, be in such a condition that it can no longer be operated profitably. It is then necessary to purchase new equipment to take its place. Such expenditures are termed "replacements.")
3. Expenditures in connection with present equipment which add to the life or efficiency of the equipment. (For instance, a machine may be entirely overhauled, and old and worn-out parts be so replaced by new ones that it will continue in use for a longer time than was originally estimated. Or a new patent may be added to the machine which, while it will not increase its length of life, will increase its efficiency during its life. Such expenditures are known as "betterments.")
4. Expenditures which are made to obtain new equipment which does not replace other equipment, but which represents an addition to the sum total of the equipment employed by the business. (As a business expands it becomes necessary to secure additional equipment in order to carry on the increased volume of business. Such expenditures are known as "additions.")

195. Treatment of different classes of expenditures

From the viewpoint of both accounting and financial management, the classes of expenditures discussed in the preceding paragraphs are distinctly different, and they must be so recorded as to show their effect on the business. Repairs are considered as a current expense of the business and must be provided for out of the income of the period in which they occur. This is on the theory that such repairs are necessitated by the operations of the period in which they occur; therefore, their cost should be borne by that period. Against this theory it is sometimes argued that repairs are not necessarily the result of the operations of the period in which they occur, but may be necessitated because, in part at least, of the oper-

ations of previous periods. In other words, the operations of one period may cause a machine to be so worn that it is almost ready to break at the end of the period, but the break with the consequent repair may not actually occur until the beginning of the next period.

The present practice assumes, however, that such breaks and repairs "even up" from period to period, since each period suffers repairs caused in part by the operations of previous periods, and, in turn, transfers "potential repairs" to the next period. It is argued that consequently the cost of repairs will tend to be approximately uniform from period to period.

Reserve for Repairs—If, for any reason, the cost of repairs fluctuates noticeably from period to period, a means to distribute the cost evenly may be secured by estimating the average cost of repairs on the basis of past experience and future plans, and by setting up a reserve for repairs. Under this method, an amount equal to the estimated average cost of repairs would be charged to Expense and credited to Reserve for Repairs, at the end of each period. As the repairs are made they will be charged to Reserve for Repairs. It is desirable, if this method be followed, that the estimate be made rather liberal so that the Reserve for Repairs account will show a credit rather than a debit balance.

Reserve for Depreciation—The cost of replacements is not an expense of the period in which the replacements take place, but is an expense of all the periods during which the equipment which is replaced has been used. If a machine costing \$500 is purchased in 1925 and is discarded and replaced by another machine costing the same amount in 1930, the year 1930 should not bear the entire cost. Each of the five years during which the

machine has been used has received a benefit from its use, and consequently each of the five years should be charged with part of the cost of replacements. As to whether each year should bear an equal part of the total cost there is not unanimity of opinion. The answer depends upon the method of calculating depreciation which is adopted. It is important to see that the standard decrease in value of the asset due to the operations of the business each year must be charged against the income derived from these operations. Since the actual expenditure takes place at one time instead of during the period of use, it is customary to credit the estimated depreciation to a Reserve for Depreciation account. When the asset is sold or discarded, its cost has been charged against this account during those years the asset has been in use. By this means original cost of asset is charged against the income of periods which benefited from its use.

If the life of the asset has been accurately estimated, and if the new equipment costs the same as the old, the total amount of equipment owned will not be changed by the expenditure for replacement. In other words, the cost of replacements becomes a charge to expense rather than to capital. Of course, errors in calculation of the life of equipment and changes in cost often cause a temporary change in the asset values, but in time these changes will be eliminated through the medium of the expense accounts. It is the ideal of accounting that replacements should not be reflected in the asset accounts at all.

Betterments and additions—When betterments are made, future periods will be benefited either through the increased efficiency of the equipment concerned or through its longer life. Since future periods are to receive

the benefit of the betterments, future periods should bear their cost. Betterments are, therefore, charged to asset accounts and are reflected in the expense accounts of the period in which they are made only to the extent that their use has added to the value produced during that period.

Additions, like betterments, are expected to benefit future periods, and hence their cost is not charged to the period in which they are obtained. Instead, by means of periodical depreciation charges, the cost is distributed over the periods during which the additions are used. Additions are a capital charge and not a revenue charge.

196. Control over the cost of maintenance

The control over maintenance cost is based upon the following three items:

1. Certain data must be available which will serve as a basis for the making of plans to secure such control.
2. An estimate must be made of the amount of such expenses and a budget prepared for each period.
3. Records must be kept and reports prepared which will make possible a proper comparison between the actual and the estimated amount of such expenditures as shown by the maintenance budget.

If these items are available, it will be possible to determine the lowest cost of maintenance consistent with efficient operation.

197. Data required as basis of control

In order to make plans which will serve to control the cost of maintenance, it is necessary that a proper classification of plant and equipment items be made and that proper accounts and records be maintained which will reflect this classification. It has been emphasized many

times in the preceding pages that financial management is possible only when it is based on the correlation of the programs of the various departments of the business. It has also been explained how a change or variation of any one department affects the programs of all the other departments. Thus, the change of the sales program or the production program affects the maintenance and equipment program, and, in order that the latter may be dependable, it must be revised as the other programs change. In order that such a revision may be made, it is necessary to have the plant and equipment items classified so that the maintenance costs can be analyzed accordingly.

Determining depreciation on equipment units—It should be obvious that a change in the production program will not affect all the equipment of the business to the same extent. For instance, it may be planned to increase the output of one department of the business, while the output of all the remaining departments is to remain the same. This increase in output is very likely to increase the maintenance expense of the one department, and, if the previous maintenance expense of this department is known separately from that of all the other departments, a more accurate estimate can be made of the increased expense. It will be necessary, however, to know more than the total cost of maintenance of the department. The new program will probably affect some units of equipment in the department more than it will affect others. It is desirable, therefore, to have statistics which will show the maintenance expense of each unit of equipment in each department.

A Plant Ledger is a record which contains an account of each separate unit of plant and equipment.

It is a ledger of accounts of plant and equipment units subsidiary to the controlling account or accounts which are kept in the main ledger. The Plant Ledger is usually kept on cards, each card providing a record of one unit of equipment. The size of this unit will vary according to conditions. There may be a separate account for each machine; or if several machines of the same pattern and size are purchased at the same time, they may all be recorded in one account and the average figure taken to represent each machine. Each account in the Plant Ledger should show at least the following three items;

1. The original cost of the equipment and date of purchase
2. The amount of depreciation accrued on it to date
3. Its present book value

In many cases it shows in addition the repairs which have been incurred on the asset to date. The illustration (page 318) shows an additional installation and readjustment of values. In examining the illustration one will notice that the first machine is revalued during the fifth year and \$75 functional depreciation recorded; whereby the annual depreciation charge for the remaining years is decreased. In the case of the second machine the estimate of its life is changed at the end of the fifth year; in consequence the depreciation rate for the remaining years is increased.

It will be understood that the repairs entered on the Plant Ledger account do not affect the value of the equipment, since they are treated as an expense and are never added to the asset. However, it is useful to have them entered on the Plant Ledger account for memorandum purposes, so that, in the making of future estimates,

it will be possible to obtain information of the past cost of repairs, not only in total, but also by departments and by units.

It is not within the province of this text to discuss the accounting features involved in the operation of a Plant Ledger, but it is necessary to emphasize its usefulness in making plans for the control of maintenance costs.

Checking Plant Ledger data—It is desirable that a periodical check be made on the accuracy of the value of the plant and equipment as shown by the records. If a Plant Ledger is maintained in the form described, it will be possible to obtain the original cost, the accrued depreciation, and the repairs incurred on each unit of plant and equipment. The depreciation shown as accrued is only an estimate, however, and the expenses which have been incurred may have been more or less than was required to maintain the equipment in an efficient condition. Unless some steps are taken to determine the accuracy of the estimated depreciation and the sufficiency of the repairs which have been made, it may be found later that both the depreciation and the repairs reserves have been inadequate, and there will be an unduly heavy or an unduly light charge against the earnings of future years. To avoid this, it is desirable that a periodical inventory or appraisal be made of plant and equipment and that this be used as a means of checking the record in the Plant Ledger. By this means inaccuracies in depreciation estimates and inadequate repairs can be discovered and corrected. It is also possible that too liberal depreciation may be allowed or too extensive repairs made; appraisals will serve to disclose this. Appraisals will also show when it is better to purchase a new machine rather than to repair the old one.

Value of appraisals—Although an appraisal of plant and equipment is quite valuable to use as indicated, it must be used with discretion, especially if the appraisal is made by professional appraisers. The viewpoint of the professional appraiser is not always that of the accountant or that of the financial executive. The appraiser is trying to determine the present value of the article. He is concerned neither with its original cost nor with the past, present or possible future value of the asset.

As a consequence, price fluctuations of the asset will be reflected in his appraisal. The accountant and financial executive, on the other hand, are not exclusively interested in the market value of the article. They are interested primarily in apportioning the original cost and the cost of repairs in as equitable a manner as possible over the periods which will benefit from its use, aside from revaluations of such assets whose functional value has undergone a change.

An increase in the market value of the asset does not directly increase its life or its efficiency; neither does a decrease in its market value decrease directly its life or its efficiency. Consequently the value of the appraiser may not agree with the book value, and yet the book record may be satisfactory. The chief importance of the appraisal is not the value which it places on the asset, but rather the appraiser's estimate of the length of life and efficiency of the asset, as reflected in the value placed on it. But in the preparation of estimates of maintenance costs, it is necessary to know not only the present value and past costs, but to know also the nature and efficiency of the plant and equipment. Consequently there should be on file, plans and specifications for all buildings and for all equipment owned by the business. By a study of such

plans and specifications in connection with the present production program and estimates of future production programs, it is possible to estimate future maintenance costs more accurately.

The estimating of repairs and depreciation is much simplified if the fixtures and equipment of a business are standardized. It is much easier to determine the maintenance costs in connection with one type of equipment than in connection with various types. It will be pointed out in connection with the discussion of control over disbursements for the purchase of plant and equipment that standardized equipment leads to economy in the original outlay. It is equally true that it leads to economy in maintenance costs as well as to accuracy in estimating such costs.

Chapter XXII

Control over Disbursements for Maintenance of Plant and Equipment—*Continued*

198. The maintenance budget

In Chapter XXI it has been explained that control over disbursements for maintenance rests upon three considerations. Those data which can be provided for in advance, that is, the data which can be obtained as a result of past experience as reflected in the accounting and statistical records and reports have also been referred to. Now it is necessary to discuss the additional data which are required, and to show how the data from various sources are assembled in order to form a maintenance budget.

199. Method of making the maintenance budget

The first step in the making of the maintenance budget is the collection of the necessary data, which data may be classified as follows:

1. Data obtained from the accounting and statistical records with reference to past experience
2. Data obtained by a mathematical calculation based on predetermined factors
3. Data determined by a consideration of future plans
4. Data obtained as a result of the investigation and study made by experts

200. Depreciation based on predetermined factors

It should be apparent that depreciation is an important factor in determining maintenance cost. All equip-

ment wears out in time, and its replacement must be provided for. This provision is accomplished by charging a certain amount to the expenses of each budget period and crediting a certain amount to a reserve for depreciation. It is clear the cost of depreciation is a maintenance cost to be provided for in the maintenance budget.

Calculating depreciation—In the calculation of the depreciation charge, four things are to be considered: the original cost of the asset; the anticipated life of the asset; its functional value as a part of the whole enterprise; and its estimated scrap value. The original cost minus the scrap value is the cost of the use of the asset during the period of its life. This cost of its use must be distributed over the period of the life of the asset in some way so that each budget period will be charged with its equitable share. There is a difference of opinion as to how this cost should be distributed, some contending that each budget period should be charged an equal amount, while others maintain that more should be charged to the earlier periods than to the later periods, because, although the equipment is more efficient when it is new and the cost of repairs is less, when it becomes older its efficiency decreases and the cost of repairs becomes greater.

Whatever method of determining the periodical charge is adopted, it should be followed throughout the life of the equipment. Consequently the determination of the periodical charge for depreciation is merely a mathematical calculation. If it is decided to charge each period a uniform amount, the depreciation item in the budget will be a constant one.

Estimating future maintenance costs—After the maintenance costs of past periods, as shown by the accounting and statistical records, have been obtained, it

is necessary to estimate how this item must be modified to correlate with plans for the future. There are many plans which may affect the cost of maintenance. If a large increase in production is planned, the consequent increase in costs must be estimated; if new methods of manufacture are to be employed, the consequent change in maintenance costs must be calculated; if new equipment is to take the place of old, the maintenance costs will be affected; if it is planned to inaugurate a policy of keeping the equipment in better repair so as to make it more efficient and prolong its life, this change must be considered. It can be seen, therefore, that there are numerous factors which affect the cost of maintenance, and all these factors must be considered.

In considering the relation of maintenance costs to future plans, one may make various comparisons. This results from the fact that some items of maintenance costs will vary in proportion to certain factors, while others will vary in proportion to different factors. Some items of maintenance costs will vary in proportion to production volume. Therefore, it is necessary to determine the ratio between the volume of production and such costs during the past. By applying this ratio to the estimated volume of production for the current period, an estimate of these items of maintenance expense for this period can be obtained. Some items of maintenance costs will vary more nearly with the floor space used than with the production volume; therefore, the ratio of floor space used in the past periods to these items of maintenance expense during the same periods will be obtained, and this ratio can be applied to the estimated floor space of the current period. Other items of maintenance costs may vary in proportion to the number of units of equipment used,

hence the maintenance budget will be increased as the number of units of equipment is increased. It can be seen, therefore, that it is necessary that past maintenance costs be analyzed very carefully and that their relation to the various factors of production be studied very earnestly if an accurate maintenance budget is to be obtained.

Checking estimates—Although the consideration of statistical and accounting data is very important in making a budget, it is not desirable to rely entirely upon such statistical studies. The results thus obtained should, if possible, be checked as to their accuracy. One method of checking the budget on maintenance is to obtain the expert opinion of professional appraisers. Such appraisals cannot be taken too literally in the determination of the value of equipment, but they are quite useful in determining possible maintenance costs. It is desirable that engineers make a periodical survey which will serve as a basis for estimating repairs.

Classification of repairs—A considerable part of the maintenance budget consists of repair expense. The repairs to be made in connection with equipment are of two kinds: those of a standard nature, the cost of which is practically uniform; and those of a special nature, the cost of which must be separately estimated and determined. A classification of the repairs showing those which are to be made on standard orders and those to be made on special orders will assist materially, not only in making the budget but also in exercising control over its execution.

201. Control over maintenance expense

After the maintenance budget has been prepared, it is necessary to have periodical reports which will make

possible a comparison between the estimated and the actual costs. The making of plans is of little value unless they are carried out; consequently, the estimating of maintenance expense is of little value unless there are reports which will make it possible to check the estimated expenditures against the actual expenditures incurred. Such reports should be made monthly, and at the end of the period there should be a final report which will afford a summary of the entire period. This final report should have columns which will show the following:

1. Last Year—Repair Expense
2. Last Year—Deductions from Assets
3. This Year—Allowance for Repairs
4. This Year—Allowance for Deductions from Assets
5. Actual Repair Expense
6. Actual Deductions from Assets
7. Per cent of Increase or Decrease of Actual over Estimated Repairs
8. Per cent of Increase or Decrease of Actual over Estimated Deductions
9. Per cent of Increase or Decrease of this year's Repairs over those of last year
10. Per cent of Increase or Decrease of this year's Deductions over those of last year

The monthly reports should show similar information.

202. Requisition for repairs

In order to exercise effective control over the cost of repairs, it is necessary that repairs be made only upon the requisition or request of the one desiring the repair. Some official should be designated to pass upon such requisitions or requests. Usually the repairs to be made are divided into two classes, according to the amount of the repairs. For instance, all repairs which will cost less

than \$100 may be termed minor repairs; while repairs which it is estimated will cost more than \$100 may be termed major repairs. Minor repairs are usually approved by some subordinate executive, while major repairs should be approved by the production superintendent or, in some cases, by the president of the corporation. In order to make such a plan feasible, it is necessary that estimates be made which will show the probable cost of any desired repair, and this estimate must accompany the requisition for the repair.

Such an estimate is necessary not only to determine whether the cost of the repair will be such as to make it a minor or major repair, but also to enable the executive who must pass upon it to judge whether the repair should be made.

203. Estimating repair costs

Estimates of the cost of repairs may be made in either of two ways. If the business maintains an engineering department, the engineer may be asked to inspect the equipment to be repaired and to make an estimate of the cost. If it is not possible or desirable to have an engineer make this estimate, it may be made by the cost department of the business on the basis of statistics gathered from the records showing costs of previous repairs. Such estimates may be faulty if they are based entirely on his records.

Of course, in time the records will show the cost of all standard repairs, so that an estimate of such repairs will not be difficult. In the case of special repairs, however, it is necessary to judge their costs on the basis of their greater or less similarity to other repairs on which data is available.

204. Keeping record of repair costs

After the requisition for repairs has been approved, there should be a carefully kept record of the cost of the repairs as they are made. The method of determining such costs is similar to the method of determining the cost of goods manufactured for sale. Each requisition, after it has been approved, should be given a number, and there should be issued a repair order authorizing the making of the repairs. The repair order should have the same number as the requisition. An account for the repair order should be opened on the cost records and all materials and labor used in making the repair should be charged to this account. If it is possible to determine the overhead chargeable to this job, this also should be charged to the cost account. When the repair order is completed, a report should be made to the executive having supervision over the repair, showing the estimated cost and the actual cost; if there is a wide variation, it is due to an inaccurate estimate or to an excessive cost. With the comparative figures available, it is possible to determine the cause of the variation. Unless such comparisons are made, it is impossible to exercise any effective control over the cost of repairs.

No profit on repairs made by company—Unless repair costs are accurate, it will be impossible to judge as to the efficiency with which the work is done or to estimate accurately the costs of future repairs. In arriving at such costs, one must remember that a business cannot derive a profit from work done for itself; hence no profit must be allowed on repair work done. It may be possible that the company performed this work for less than outsiders would have charged. This results in a saving to the company, but it does not result in a profit.

Separate repair cost accounts—Separate cost records should be kept on standing maintenance orders, or those which occur regularly in connection with the standard equipment, and on special maintenance orders, or those which arise occasionally in connection with special repair work necessitated by particular conditions. Such records afford most useful statistics, not only for judging past results but also for planning future costs. There is also danger that special repairs will become unduly large. It is not difficult to spend more in repairing and overhauling a machine than it would cost to purchase a new one; the records of manufacturing firms show that this has occurred far too frequently. During the past few years there has been a tendency to increase revenue expenditures and to decrease capital expenditures.

205. Reserve for emergency repairs

It is not possible to estimate in advance each item of maintenance expense to be met during the coming period. Unforeseen emergency repairs will always be necessitated. It is desirable to anticipate such repairs, however, and to include in the maintenance budget for each period an item to cover them. Since such repairs vary in amount from period to period, it is well to credit the estimated amount to a Reserve for Repairs account and in this way to provide for them in each budget. When repairs are made, the cost can be charged against this reserve. This is desirable, since it will prevent a fluctuation in costs because of such expenditures. It is obvious of course that such a reserve has a limited use and must not be utilized as a means of hiding the excessive costs of certain periods. If such a reserve is too large in amount, that fact prevents the control of maintenance costs for which the maintenance budget is intended.

206. Executive control of maintenance expense

Some executive should exercise control over maintenance expense. In most businesses this duty is delegated to one of the principal officers of the company. As an illustration of such control, the following quotation is given from a general order defining the duties of the vice-president in charge of production in a large manufacturing business:

Construction, Maintenance and Operation

1. Constructing, installing, or authorizing the purchase of, and installing all improvements and additions as to the land, buildings, equipment, machines, tools, and patterns and dies not chargeable to specific jobs at each works
2. Keeping up and repairing such property and employment of outside service therefor, including watchman and fire protection service
3. Operating the heat, light, power, and water service at each works and seeing to it that proper service is rendered by all outside companies concerned in such service
4. Constructing or installing improvements and additions to, or repairing owned property at the branch, general, or division offices on requisition by the executive having jurisdiction over such property

207. Relation of maintenance expense to production costs

When increased production is planned, it is necessary to plan for increased maintenance expense. It should be realized, therefore, that maintenance expense constitutes an important element of production costs. Consequently it is necessary in planning future production to consider the increased maintenance costs necessitated by the production plans. This again illustrates the necessity for a correlation of all the departmental plans of the business, and such correlation is possible only by means of budgetary control.

should be realized, therefore, that maintenance expense constitutes an important element of production costs. Consequently it is necessary in planning future production to consider the increased maintenance costs necessitated by the production plans. This again illustrates the necessity for a correlation of all the departmental plans of the business, and such correlation is possible only by means of budgetary control.

Chapter XXIII

Control over Disbursements for Plant and Equipment

208. Classification of plant and equipment disbursements

Expenditures in connection with plant and equipment may be classified as follows: (1) those necessary to maintain the plant and equipment in its normal efficiency; and (2) those adding to the efficiency, the length of life, or the quantity of the plant and equipment owned. This chapter is concerned in the discussion of the second class and the methods of controlling disbursements for plant and equipment.

209. Requirements for plant and equipment control

In order to exercise effective control over disbursements for plant and equipment three things are necessary:

1. Availability of certain data showing the results of past operations and serving also as the basis for future plans
2. After the formulation of the plans, the necessity for expressing them in workable form by means of a budget on plant and equipment
3. After the budget has been made, the necessity for preparation of records and reports making possible the control of such expenditures and the enforcement of the budget plans

210. Data classification for plant and equipment control

A standard classification of accounts with plant and equipment is desirable not only for controlling mainte-

nance costs, but also for controlling plant and equipment expenditures.

Such a classification makes it possible to secure a more accurate record of expenditures, and this makes possible both a more comprehensive interpretation of past costs and a more accurate estimate of future costs.

The following quotation taken from the standard classification of accounts of a large manufacturing business will enable the reader to gain a clearer understanding of the purposes of such a classification:

Plant and Equipment Accounts

100010. Miscellaneous real estate improvements

1. Gatemen's and watchmen's houses and fences
2. Sewers and yard sanitary equipment
3. Heating mains with tunnels or supports in yard
4. High-pressure water mains, hydrants, etc., for fire protection
5. Water-supply mains, etc., includes wells, cisterns, and low-pressure mains in yard
6. Other piping in yard—includes compressed-air, steam power mains, oil lines, etc.
7. Standard gauge railway track
8. Narrow gauge railway track
9. Crane runways
10. Pavements, roadways, and walks
11. Docks, piers, and wharves
12. Bridges, subways, and retaining walls

100021. Foundry and forge shop buildings and accessories

1. Buildings proper
2. Plumbing and sanitary fixtures
3. Heating and ventilating equipment
4. Elevators (exclusive of one at cupola)
5. Fire protection equipment

100022. Manufacturing buildings and accessories

1. Buildings proper
2. Plumbing and sanitary fixtures
3. Heating and ventilating equipment
4. Elevators
5. Fire protection equipment

100023. Stores and office buildings and accessories

1. Buildings proper
2. Plumbing and sanitary fixtures
3. Heating and ventilating equipment
4. Elevators
5. Fire protection equipment

200060. Small tools, jigs, etc.

- | | | |
|-----|------|---------------------------|
| 200 | 160. | Grey iron foundry |
| 200 | 260. | Blacksmith shop |
| 200 | 360. | Malleable foundry |
| 200 | 460. | Tapping |
| 200 | 560. | Malleable annealing |
| 200 | 660. | Iron body valve |
| 200 | 760. | Pipe fabricating |
| 200 | 860. | Wrench |
| 200 | 960. | Tap and die |
| 201 | 060. | Nipple |
| 201 | 160. | Steel polishing |
| 201 | 260. | Hardening |
| 201 | 360. | "X" factory union forging |
| 201 | 460. | Brass finishing |
| 201 | 560. | Brass foundry |
| 201 | 660. | _____ |
| 201 | 760. | Galvanizing |
| 201 | 860. | Drive well point |
| 201 | 960. | Screw machine |
| 202 | 060. | Pipe shop |
| 202 | 160. | Radiator |
| 202 | 260. | Union |
| 202 | 360. | General tool making |
| 202 | 460. | Die sinking |
| 202 | 560. | Brass tool making |

202 660. Machine repair

202 760. Wood pattern

202 860. Metal pattern

200064. Fixtures, furniture, and miscellaneous equipment

200 164. Grey iron foundry

200 264. Blacksmith shop

200 364. Malleable foundry

200 464. Tapping

200 564. Malleable annealing

200 664. Iron body valve

200 764. Pipe fabricating

200066. Electric wiring and fixtures

200 166. Grey iron foundry

200 266. Blacksmith shop

200 366. Malleable foundry

200 466. Tapping

200 566. Malleable annealing

200 666. Iron body valve

200 766. Pipe fabricating

200070. Machinery and large equipment

200 170. Grey iron foundry

200 270. Blacksmith shop

200 370. Malleable foundry

200 470. Tapping

200 570. Malleable annealing

200 670. Iron body valve

200 770. Pipe fabricating

The foregoing illustration is sufficient to indicate how a classification of accounts may be made. In the first place, it will be noticed that the buildings and accessories are given one group of accounts which commence with the key number 1000, while the tools, equipment, and fixtures to be used in the buildings are given a different group of accounts which have the key number

2000. It will be noticed that each department is designated by a specific number. Any equipment in the grey iron foundry will be designated by a number containing the figure 1; the equipment in the blacksmith shop by a number containing the figure 2, etc. These numbers are of course arbitrary, but they are used consistently. It will also be noticed how similar items under different classifications are represented by numbers which indicate this similarity. For instance, it will be noticed that the items in the grey iron foundry are numbered as follows:

| | |
|-----------------------------------------------------------|---------|
| Small tools, jigs, etc. | 200 160 |
| Fixtures, furniture, and miscellaneous equipment. | 200 164 |
| Electric wiring and fixtures. | 200 166 |
| Machinery and large equipment. | 200 170 |

After a proper classification of accounts with plant and equipment has been made, it is next necessary to keep adequate records showing this classification as well as such other information as may be desirable.

211. Standardization of equipment

Most large businesses have found it desirable to standardize their equipment as much as possible. Such standardization is especially desirable for furniture, fixtures, and office equipment. To that end businesses frequently select a standard type of desk, standard typewriters, and standard calculating machines to be used in all offices. Any other type of office equipment which is in general use should be standardized if possible; factory equipment should also be standardized when practicable. There are several advantages in having standardized equipment:

1. Buying all equipment from one company will doubtless obtain more favorable terms. At least it prevents the purchasing of unduly expensive equipment by some departments when less expensive equipment would do as well.
2. It facilitates the purchasing of new equipment, since a requisition can be made out for one unit of equipment and sent to the general purchasing agent who knows what to purchase and the cost. This saves time and effort.
3. It facilitates future planning, for it is necessary only to estimate the number of units required, the cost being easily obtained.
4. It makes possible shifting equipment from one department to another, thereby preventing a surplus or shortage in any department.
5. In case of equipment in the operation of which technical skill is required, having standardized equipment facilitates the transfer of employees from one department to another.

212. The plant and equipment budget

It has been suggested what may be done to make available the information which is necessary for the preparation of the plant and equipment budget; it is now necessary to see how this information is formulated into such a budget.

The requirements for additional plant and equipment are dependent upon the general budgetary plans of the business. It is especially necessary that the plant and equipment budget be correlated with the production budget. Plans should be made for the purchase of just such equipment as increased or decreased production will demand.

Equipment to meet production plans—In estimating the effect of future plans upon the cost of plant and equipment, there are many factors which must be con-

sidered. There are many plans which affect such costs. If a large increase in production is planned for, the cost of the additional equipment which will be needed for that purpose must be estimated. If new lines of goods are to be manufactured, this fact will be an important consideration. It can be seen that there are numerous factors affecting the expenditures for plant and equipment.

In considering the relations of plant and equipment expenditures to future plans, various comparisons may be made. This results from the fact that some plant and equipment needs will be in proportion to certain factors, while other plant and equipment needs will vary in proportion to other factors. The demand for certain equipment will vary in proportion to production volume; past records will show that a certain volume of production can be secured from certain equipment. Each unit of the equipment is used to produce a certain volume, and the units needed can be determined by dividing unit capacity into the total production volume expected.

Each unit of equipment employed requires a certain amount of floor space. After the number of additional units to be secured has been determined, the additional floor space required can be calculated. On the basis of past records, the cost of such additional space can be estimated. In some cases equipment needs will vary in proportion to the number of employes engaged in production. It may be necessary, therefore, to determine the number of employes required under the proposed production program and to estimate certain plant and equipment needs on this basis.

Equipment to meet sales and administration plans—It may be pointed out that not all plant and equipment needs are dependent on the production program. Some

plant and equipment is needed in the carrying on of the other activities of the business, such as those of the sales and the administrative departments. For instance, office space and equipment is required by both the sales and the administrative organizations. As the business expands, additional space and equipment will be required, and these requirements must be given consideration.

213. Estimating the costs

If cost records have been properly kept, the probable costs can be estimated from these. It can be seen, therefore, that it is necessary that the past cost of plant and equipment be carefully analyzed and that their relation to the various factors of production be earnestly studied, if an accurate plant and equipment budget is to be obtained.

Although the consideration of statistical and accounting data is very important in making estimates of the future, it is not desirable to rely entirely upon such statistical results. The results thus obtained should be checked as to their accuracy if possible, one method of checking the budget on plant and equipment being to obtain opinions of professional engineers. Although such opinions should not be relied on absolutely, they are of great value as a means of checking the estimates made.

In making the plant and equipment budget, it is necessary to distinguish between additions to present standardized equipment and additions to equipment made necessary by obsolescence or by new factors in the business. The cost of additional standardized equipment resulting from increased production can be estimated fairly well on the basis of past expenditures, but the cost of equipment made necessary by obsolescence or new

factors in the business must be considered as an additional cost beyond that indicated by the normal increase in production. Moreover, in the use of past statistics as a basis of future estimates, it is necessary to determine whether such unusual costs are included. If so, they must be excluded before the statistics are used for comparative purposes.

214. Control over plant and equipment disbursements

It is necessary that a plant and equipment budget be prepared in order that effective control may be exercised over disbursements for plant and equipment. After such a budget has been prepared by those to whom that duty has been delegated, it must receive executive approval. In some cases, it may be submitted to the board of directors; in others, the board of directors may delegate to the president the duty of approving it; and in some cases it may be passed on to a committee composed of the principal executives of the company.

Guarding the appropriations—The approval of a budget involves the making of various appropriations for the necessary amounts to cover the cost of the various items included in the budget. After these appropriations are made, it is customary to delegate to some official in the company the authority to grant expenditures under the appropriations. That this executive may exercise effective control over such disbursements, these disbursements must be made only upon requisitions. When additions to plant or equipment are desired by any department, the head of the department should submit a requisition to the executive in charge of the appropriations. Such requests should be accompanied by a statement of the probable cost of the additions. If the equipment is to be

purchased from outside vendors, it is easy to obtain the purchase cost and to submit it with the requisition; if the additions to plant or equipment are to be constructed by the company itself, the requisition should be accompanied by an estimate of the cost.

Estimating the cost of additions—The estimate of the cost of such additions may be made in either of two ways: First, by asking the engineering department, if there is such, to estimate the cost of the proposed addition. A capable and experienced engineer can do this quite accurately. Secondly, by having the accounting department make the estimate, the estimate being on the basis of cost of previous additions. In the case of special equipment, however, it is necessary to judge its cost from its similarity to other equipment on which data is available, the comparison being made very carefully in order to avoid errors. It is important to consider price changes, for example in labor cost, in cases in which statistics of cost of previous additions are being used.

215. Keeping records of costs

If the requisition calls for the construction of additions to plant and equipment by the factory, there should be careful records kept of the cost of such additions. The method of determining such costs is very similar to the method of determining the cost of goods manufactured for sale. After each requisition has been approved it should be given a number, and a construction order authorizing the making of such additions should be issued and given the same number as the requisition. An account should be opened on the cost records for the construction order, and all materials and labor used in making the improvement should be charged to this

account. If it is possible to ascertain the overhead chargeable, this should also be included in the cost account.

When the construction order is completed, a report should be made to the executive having supervision over the construction; this report should show the estimated cost and the actual cost. If the two differ greatly, either the estimate was inaccurate or the costs were unduly large. With the comparative figures available, the cause of the variation can be determined. Unless such comparisons are made, there can be no effective control over the cost of construction work.

Great care should be taken to ensure the accuracy of the costs charged to construction orders, for unless the cost records are accurate, they will be worthless as a basis from which to judge the efficiency with which the work has been done or from which to estimate correctly the cost of future construction.

It is desirable that separate cost records be kept on the construction of standard equipment and on the construction of special equipment. Such separate costs afford most useful statistics not only for judging past performance, but also for estimating future costs.

No profit on work done by the company—No profit must be allowed on construction work done by the company. It may be possible that the company performed this work for less than outsiders would have charged; this would result in a saving to the company, but it would not result in a profit.

Reserve for contingencies—It is not possible to estimate in advance every item of future plant and equipment costs since there will always be unexpected needs for equipment. An item should be included in the plant and equipment budget of each period to cover

additional costs due to unexpected needs. Such additional costs will vary in amount from period to period, and it is well to set up a reserve account of the amount considered necessary to provide for them. When the costs are incurred, they can be charged against this reserve. Additional costs may be due to rising costs of material, equipment, or labor, or to other causes. By employing the method above outlined, such costs can be taken care of when they arise.

Such reserve must have a clearly defined use and must not be made a means of hiding excessive amounts paid for additions. If the reserve is too large, it will prevent the desired control over disbursements for plant and equipment.

216. Reports as means of control

The exercise of any effective control over the plant and equipment budget necessitates periodical reports, making possible a comparison between the amount appropriated for such expenditures and the actual amount expended; such reports should be made monthly in connection with each appropriation contained in the maintenance and equipment budget. A report of this kind should contain the following columnar headings:

1. Amount Appropriated
2. Cash Expenditures to Date
3. Accounts Payable—Outstanding
4. Amount Available
5. Expected Expenditures during Coming Month
6. Comments

A report giving the information indicated by this columnar ledger may be of service not only to the executive who is exercising control over the purchases and

construction of plant and equipment, but also to the financial executive. It will show the former the amount which he has available for future purchases or construction, and it will show the latter what funds will be needed and when. The third and fifth columns are especially valuable to the treasurer, since they indicate to him the payments which must be met in the near future. At the end of the year a report should be submitted showing the total disbursements made under the several appropriations and the balances remaining in them. It is evident that appropriations should not be exceeded except by permission of the same authority which granted the original appropriation.

217. Executive control over expenditures

Usually the supervision of expenditures is vested in one of the principal executives of the company. In a manufacturing business, this responsibility is frequently placed on the superintendent of production. As an illustration of such control the following quotation is given from a general order defining the duties of the vice-president in charge of production in a large manufacturing business.

Engineering Functions as to Equipment

- a. Investigating the necessity for new production, operating, and maintenance equipment, and the relative advantages of manufacturing as against purchasing such equipment
- b. Designing and specifying such equipment where it is to be manufactured by the Manufacturing Company
- c. Specifying or approving specifications for such equipment, where it is to be purchased

- d. Preparing requests for appropriations for such equipment and analyzing actual costs thereof, as well as costs of other equipment not involving appropriations
- e. Testing equipment where tests require laboratory apparatus
- f. Maintaining such records of machine capacity and performance as the works manager may require
- g. Investigating layout of machinery with reference to routing of work in process, and preparing appropriation requests for re-arrangements approved by the works manager

Engineering Functions as to Buildings and Grounds

- a. Investigating the necessity for
- b. Designing and specifying such extensions, alterations, and repairs; and recording, distributing, and filing such designs and specifications
- c. Analyzing the cost of such extensions, alterations, and repairs
- d. Inspecting such work and assisting the superintendent of maintenance on engineering problems connected therewith

218. Plant and equipment costs and production costs

When increased production is planned, it is usually necessary to plan for securing additional plant and equipment. The cost of such equipment must be considered as an important factor in preparing a production program. In some cases it may be found that the acquisition of this additional equipment will impose such a financial burden upon the business that it will be unwise to attempt the increased production. This again illustrates the necessity for a correlation of all the departmental plans of the business, and such correlation is possible only by means of budgetary control.

Chapter XXIV

Control over Disbursements for Expenses

219. Need for expense control

In the operation of a business it is necessary to incur numerous expenditures which in accounting and business practice are designated by the general term of expenses. Expenses are incurred in connection with the operations of all the functional departments of a business. In the securing of sales, expenses are incurred for help, postage, stationery, supplies, and advertising. In the production of goods, such items as heat, light, power, supplies, and miscellaneous labor must be purchased. In the maintenance of plant and equipment, repair and replacement costs must be provided for. In the general administration of a business, expenses of various kinds are necessary.

Although many expenses are incurred in small amounts, the sum total of all expenses in most businesses is sufficiently great to absorb a large percentage of the returns from sales. The amount of the expenses of a business is apt to determine whether it operates at a profit or at a loss. Its sales and purchases are presumably made in a competitive market where it has the same advantages as its competitors. To the extent that this is true the gross profit of competing businesses should tend to be the same. But the expense element in different businesses varies widely and in this fact lies, to a great extent, an explanation of the wide variations in the net profits.

Since expenses are incurred by all departments of a business and are largely intangible in nature, with the

single items small in amount, control of them is difficult. Expenses have a tendency to increase constantly and as they increase the profits of the business tend to decrease. To secure a control of expenses which is effective and yet not unduly burdensome is one of the most important tasks of business administration.

From the viewpoint of financial management an effective control of disbursements for expenses is especially significant if such expenditures are to be restricted to a necessary minimum. It is impossible to carry out financial plans unless effective control is exercised over all expenditures incurred under these plans; and since expenses constitute a large item in the list of expenditures, a failure to control their amount may result in the failure of an entire financial plan.

220. Classification of expenses

One of the first steps in effecting a proper control of expenses is the establishment of a proper classification of them. It is obvious that administrative attention cannot be given to each separate item of expense. This fact necessitates that a classification be made which will make possible the focusing of executive attention on groups of related items.

Expenses may be classified in different ways according to the purpose for which the classification is to be used. Accountants have long been accustomed to divide expenses into two major groups known as operating and non-operating. Under operating expenses are included those which are incurred in carrying on the regular operations of the business; while under non-operating are included those incurred in carrying on incidental operations. For instance, the expenses incurred by a mer-

chant in the buying and selling of his merchandise are operating expenses; the expenses incurred by him in the buying and selling of bonds are non-operating expenses, for it is not the function of a mercantile store to deal in bonds.

The classification of expenses as operating and non-operating is useful in judging the earning capacity of a business, but it is not sufficient to serve as a basis for administrative control of expenses. Accountants are accustomed, therefore, to show operating expenses subdivided as manufacturing, selling, and administrative. This classification is useful for control purposes since it shows the expenses classified according to the major groups of business activities. In some businesses this classification may serve satisfactorily. However, it may well be questioned whether, as a general practice, it is sufficient.

221. Objections to customary classification

There are three objections which may be offered against the customary classification:

1. That it fails to recognize certain well-defined groups of activities such as are involved in the administration of personnel, finance, standards and records, etc. (This is probably due to the fact that these activities were not regarded as separate functions at the time the conventional classification of expenses became crystallized. For instance, in the early development of business organization each department handled its own personnel problems, while the president of the company usually acted as treasurer, with an assistant who acted merely as cashier. The standards and record function was not sufficiently developed to make it seem expedient to establish a separate department for it. The cashier, sometimes called the treasurer, was usually in charge of the accounting; and the cost of maintaining the scanty records kept was included as administrative expense.)

2. That it causes a great many items of expense, such as those mentioned above, to be lumped under the general head of administrative which, as a matter of fact, are not under the direct control of the chief executive or his staff. (This makes it impossible to exercise effective control either of these expenses or of the expenses for which the chief executive should be held responsible. The chief executive and his staff should be held responsible for the expenses under their control the same as in the case of minor executives.)
3. That it causes a number of items which may be considerable in amount to be placed under the general head of non-operating expense without fixing definite responsibility for incurring them. (As an extreme case of this practice some companies show depreciation on fixed assets as a subtraction from net profits.)

222. Suggested classification

It is desirable from the viewpoint of administrative control that expenses be classified to conform to the organization within the business. In other words the expenses are grouped according to units of responsibility and the head of each executive unit is held accountable for the expenses incurred in performing the activities which he directs. A possible classification for a business with a functional grouping of administrative duties would be as follows:

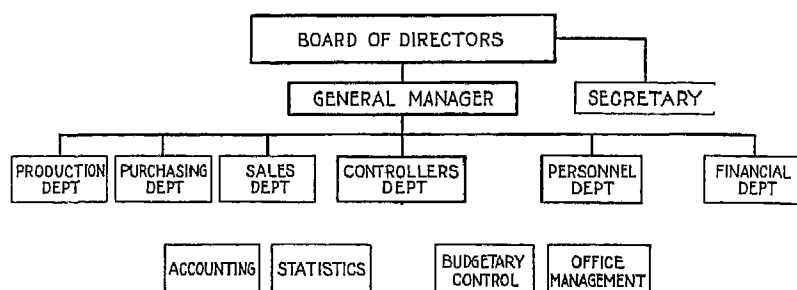
1. Manufacturing expenses, or those incurred in the operation of the factory and the production of the commodity or service which is offered for sale. (These expenses would occur, of course, only in the case of a manufacturing business.)
2. Buying expenses, or those incurred in purchasing the commodity which is offered for sale, or in purchasing the materials and supplies which are used in production. (The cost incurred in buying the supplies used by all the various departments is also included under this head, but the purchase cost is charged to the departments using the supplies.)

3. Selling expenses, or those incurred in the marketing of the product produced or purchased for sale
4. Personnel expenses, or those incurred in the procurement and maintenance of an efficient working force
5. Financial expenses, or those incurred in planning and controlling the receipt, custody, and disbursement of funds
6. Controller's expenses, or those which are incurred in the performance of the standards and record function. (Under this heading may be included the expenses of the accounting, statistical, and office manager's department and the expenses of establishing and enforcing the budgetary procedure as well as the operating procedure of all the functional departments.)
7. Executive or general office expenses, or those incurred in the general administration of the business and not chargeable to any of the foregoing groups. (This group includes the expenses of the general manager and his staff.)
8. Corporate expenses, or those not incurred as a result of the operations of any particular department, but necessary that the business may exist and operate as an entity. (Directors' fees and expenses, capital stock tax, and income taxes are illustrations of such expenses.)

The foregoing is intended only to be suggestive of a classification of expenses which is suitable for a business having a well defined functional organization. Modifications will have to be made in the case of different businesses. For instance, where there is not a controller or a personnel manager, it may be necessary to set up a group of expenses termed auxiliary expenses and to include under this heading the cost of maintaining the accounting, statistical, office manager's, and employment departments. Other modifications will suggest themselves to the reader. The essence of the foregoing classification is the method of analysis and classification which it illustrates rather than particular groupings.

223. Relation of expense classification to organization

In an organization of any considerable size the various officers responsible for carrying on the business will assume responsibility for distinct groups of activities. This placing of responsibility may be very definitely indicated in the by-laws of the corporation, or it may be shown in part by the adoption of a chart of organization which is posted for the information of employees. In any case, the expense classification must be made to correspond to the functional organization of the business. For instance, the classification of expenses given in the foregoing discussion is based on the organization shown in the accompanying chart.



224. Direct and indirect expenses

There are some expenses incurred for the benefit of only one department and these can be charged directly to that department. For instance, the salaries of the sales clerks can be connected directly with the operations of the sales department and charged to selling expense. The repairs on factory equipment can be connected directly with the operations of the production department and charged to manufacturing expense. These are known as direct expenses.

There are other expenses incurred for the benefit of two or more departments and therefore not chargeable directly to the expenses of any one department. For instance, the expenditures for light and heat are for the benefit of all the departments of a business. It is necessary to allocate these expenditures to the various departments which are benefited by them. These are known as indirect expenses.

The expenses which are here termed indirect are referred to in different terms by writers and practitioners. They are called overhead, burden, non-productive, etc. The terminology of accounting and business management is not standardized.

It is impossible to use terms which have a uniform meaning and usage. The most that can be done is to define clearly those used and to limit their use to the definition given.

225. Allocation of indirect expenses

In most businesses the indirect expenses are of sufficient amount to make their allocation a matter of major importance if a proper classification of expenses is to be maintained. Accountants and industrial engineers have given much thought to the problem of allocating indirect expenses.

Two questions arise from a consideration of this problem: (1) What expenses should be allocated and to what departments? and (2) On what basis should the allocation be made? In answering the first question one must consider the purpose for which the allocation is being made. Or, to carry the inquiry one step further, it is necessary to know for what purpose the expenses were incurred.

226. Allocation of manufacturing expenses

Most of the discussion as to allocation of indirect expenses in the past has dealt with the allocation of manufacturing expenses to classes of product or to specific "jobs" or order lots. The purpose of this allocation is to obtain unit costs. The problem here is one of intra-departmental distribution; it is a question of distributing the total manufacturing expenses over the total product produced so that each unit of the product will bear its proportionate part of these expenses.

There is some question as to what should be included under manufacturing expenses, but this is not a very acute one. The attention given to factory costs during the past few years has led to a careful consideration of what elements should be included in their determination, and there has been developed a fairly uniform opinion as to what expenses should be classified as manufacturing expenses. There are some items, such as interest on investment and rent, which are yet the subject of controversy.

227. Allocation of commercial expenses

Until recently, there has been little attempt to apply the principles of costs, as developed in connection with production, to the determination of selling or administrative costs. Much attention has been given to the unit cost of production, but little attention has been given to the unit cost of marketing or to the unit cost of administration. There are certain inherent difficulties which make the determination of unit costs difficult, and, in some cases, there may be doubt of their usefulness.

As a consequence of the failure to develop these commercial costs, there has been much less attention

given to the classification of commercial or non-manufacturing expenses than has been given to the distinction between manufacturing and non-manufacturing expenses.

Usually the commercial expenses, which represent the difference between gross profit on sales and net operating profit, are grouped under the two general headings of Selling and Administrative. All items not clearly selling expense are usually placed under administrative expense. In case of doubt with reference to any particular item, it is placed in the latter group which, consequently, comes to contain a great many items of a miscellaneous nature. Subclasses may be maintained under each of these major groups of expense but usually no great care is exercised in the allocation of expenses within the subclasses.

As a consequence of these practices, there has been a decided tendency to slight a consideration of the question of allocating indirect commercial expenses. When such allocation has been made, it has frequently been on an unscientific basis. Department stores and some few other businesses have broken away from the traditional policy and have given careful consideration to the allocation of these expenses, but such a practice has been the exception rather than the rule.

228. Expense allocation and organization of business

Thus it is seen that the consideration of expense allocation has been confined largely to manufacturing expenses and has here been limited in the main to a consideration of their allocation as a basis for unit costs. Unit costs are useful and desirable, but in the desire to obtain these there has sometimes been a tendency to overlook one of the important purposes of cost statistics.

It is not sufficient to know what costs are—in addition, it is necessary to control costs so that they will be as small as possible.

In modern business organization, control is exercised through persons who are in charge of the organization. If control of expenses is to be effected through members of the organization it is necessary that expenses be classified so as to show their origin and the persons responsible for them. If responsibility is taken as the controlling factor in an expense classification, each department will certainly be charged with those expenses over which the executive head of that department exercises control. In addition, each department may be charged with some items of expense the amount of which is fixed or at least beyond the control of any officer.

As an illustration: The production department will be charged for the supplies used in production, for these are under the control of the production manager. It will be charged also with the depreciation on production equipment, the estimated amount of which is determined in most cases by others than the production manager. The depreciation should be treated as a manufacturing expense, for it is a direct result of the operations of the production department and is necessary to the proper performance of the production function. The production manager could not affect the amount of depreciation if the duty of determining it were left to him, for its amount is fixed by definite factors such as cost, scrap value, estimated life, and final price received for the product.

229. Expenses which should not be allocated

As an illustration of the type of expenses which it seems may better not be allocated to a department, the

salaries and expenses of the president and his staff may be mentioned. It is sometimes contended that the president supervises and directs all the departments of a business; therefore his salary and that of his staff should be allocated to the functional departments. For instance, a portion of these expenses will be charged to selling expense. It seems that such a policy is unwise since such salaries are variable in amount, subject to the will of the president and the board of directors, and are neither directly nor indirectly under the control of the sales department. If these salaries are increased the sales expense will be increased and the sales manager is powerless to prevent such a change.

The author recalls a case in which the compensation of the sales manager was affected by the ratio of selling expense to sales. After the passage of the income and excess profits tax law of 1917, the corporation increased the salaries of some of its executives. The corporation is a close one and certain of the executives are the principal stockholders. Large salaries were considered better than large profits. The sales manager had put forth an unusual effort to increase his sales for the next year and had attained marked success. But when the increased salaries were allocated to the departments, the sales expense was so increased that the bonus of the sales manager was smaller than for the previous year, despite the unprecedented increase in sales.

It is admitted that the foregoing is an extreme case, but it illustrates an important principle. If a department is charged with variable expenses over which its executive head and his assistants have no control, the value of the departmental expense reports as a basis of administrative control is largely destroyed. Expenses, like sales,

production, and purchases can be adequately controlled only when estimates are made by officials who can be and who are held responsible for the attainment of these estimates. Such a procedure is greatly weakened if executives are held responsible for expenses over which they do not exercise control.

In regard to allocation of expense it may be stated that no expense should be allocated to a department if such allocation will affect in a material way the fixing of responsibility for the expenses of the department. There are of course cases where expediency will dictate a variation from the application of this general principle, but such variations should be permitted only for good reasons.

230. Basis of allocating expenses

Cost accountants have given much consideration to the allocation of manufacturing expenses to factory departments and to manufacturing orders, and various methods have been employed.

In the early development of factory costs the factory cost accountant found the easiest method of distributing manufacturing expenses to be on the basis of direct labor. Likewise, the mercantile cost accountant has found the easiest method of distributing commercial expenses to be on the basis of sales. Consequently, sales have been used very extensively by department stores as a basis for allocating expenses to the various departments of the store.

But the factory accountant has found that the distribution of expenses on the basis of labor often gives incorrect results; and the commercial cost accountant has found that the distribution of commercial expenses on the basis of sales may give results equally unsatisfactory.

To illustrate: One of the largest items of expense to be allocated in a department store is advertising. Formerly, the method of allocating this to the various departments of the store was usually on the basis of sales. This has led to two undesirable results. First, some departments profit much more than others by the advertising since it is devoted to the articles sold by some departments much more than to the articles sold by other departments. For instance, the advertising of ladies' ready-to-wear clothing will usually be much more extensive than the advertising of groceries. Yet the sales of the grocery department may be larger than the sales of the ladies' ready-to-wear department and the grocery department would therefore be charged more for advertising. This plan gives inaccurate figures and, if the departmental heads are paid a bonus on profits, the plan leads to an unfair charge against the profits of the head of the grocery department. Secondly, if advertising is distributed on the basis of sales and there is a chance that the cost may be materially evaded, department heads will urge advertising which they otherwise would not favor. To use a more concrete example, the head of Department A may be contemplating certain advertising of the articles which his department sells. The advertising will cost \$500. If the entire \$500 were to be charged against his department, he might decide immediately not to request this expenditure. If, however, there are ten departments, and he knows that, on the basis of sales, only \$60 of the cost of the advertising will be charged against his department, he will feel that it must certainly be worth more than that to him and so he will urge that it be done. The tendency, therefore, will be for the ratio of advertising to sales to increase constantly. Of course

a capable advertising manager or merchandise manager may check this tendency, but it will have to be guarded against constantly with a strong probability that the advertising will be larger as a result thereof.

The brief consideration given to the method of allocating indirect expenses affords the basis for the statement of the general principle that care should be exercised to allocate them in such a manner as to attain two results: (1) to secure as great accuracy as possible; and (2) to fix responsibility in such a manner that those responsible for the expense will desire to decrease and not to increase it.

231. Manufacturing expense

The costs incurred in the production of the finished product are divided into two broad classes: direct and indirect. "Direct costs are payments or charges for labor and material expended upon a definite department or unit of product. Small costs, however, will not be charged directly to the product even when the latter can be determined, unless the increased accuracy of the records justifies the clerical work entailed. It follows, therefore, that indirect costs are those which cannot be charged economically or directly to the product. An example of a direct cost is the cost of the raw material in a chain. An example of indirect cost is wages of foremen who supervise the employees in several departments where chains are made, and the cost of oil used on machines which are employed in the production of the chains. Adherence to the above cost classification adds to the accuracy of the records; because, by charging items directly to the cost units, when economical, the remaining costs are less than if certain items legitimately direct were

treated as indirect costs. Indirect costs are distributed over the product in as accurate a manner as possible, but such charging is less accurate than is direct charging. For instance, raw material can be accurately measured and charged directly against a chair. The depreciation of the equipment used in manufacturing the chair cannot be determined with any measuring device; it must be estimated. Consequently the total depreciation of equipment is distributed over all units of product made. Any charging therefore which reduces the distributable cost thereby increases automatically the accuracy of the cost record."* The items which compose manufacturing expense will vary in different businesses according to the nature of their operations. The following are those which appear in most cases:

- | | |
|----------------------|--------------------|
| 1. Indirect material | 8. Maintenance |
| 2. Supplies | 9. Depreciation |
| 3. Indirect labor | 10. Power |
| 4. Supervision | 11. Heat and light |
| 5. Inspection | 12. Small tools |
| 6. Experimental work | 13. Taxes |
| 7. Repairs | 14. Insurance |

The foregoing items are sufficient to be indicative of the items which compose manufacturing expense. The reader can probably supply others from his experience.

232. Buying expense

The items to be included under buying expense will depend to considerable extent on whether a business is carrying on mercantile or manufacturing operations. In the former case, the expenses and salaries of the depart-

*Jordan and Harris, "Cost Accounting."

mental buyers will be included, plus a part of the salaries and expenses of the merchandise manager. If the departmental buyers devote part of their time to sales their salaries will need to be allocated. In a manufacturing business salaries and expenses of the purchasing agent and his assistants will be regarded as buying expense. In both cases there should be included in expenses all expenditures for supplies, clerical help, supervision.

233. Selling expense

There is considerable difference of opinion among both accountants and business men as to what should be considered as selling expense. This fact is probably due to several reasons. There are many items of expenses which contribute more or less indirectly to the making of sales. Sales consummate the process which results in the securing of a profit, and so it is not difficult to reason that the purpose of many of the operations of the business is to secure sales and that the expenses incurred in these operations should be treated as selling expenses. From the viewpoint of administrative control, it is desirable that expenses should be classified so as to indicate the person responsible for incurring them. Executive control can be exercised only in terms of organization. A member of an organization can be held responsible only for that over which he exercises control. If responsibility is taken as the controlling factor in sales classification, selling expense will include all expenses which are under the control of the salesmen, manager, and executive head of the sales department and in addition such miscellaneous items as are directly connected with sales and the amount of which is fixed, or at least beyond the control of any officer.

An illustration of the former is salaries of employees in the sales department which are under the direct control of the sales manager. An illustration of the latter is depreciation on delivery equipment, the estimated amount of which is usually determined by others than the sales manager. The amount of the depreciation may properly be treated as a sales expense for it is connected directly with the sales function and its amount cannot be affected by the action of the sales manager even if he had control of the establishment of its amount.

These illustrations should be sufficient to enable the reader to determine the proper treatment of other items about which there may be a question. There are some few items, the classification of which depends upon a decision with reference to the purpose for which they are incurred, and there is not a unanimity of opinion in many cases with reference to this purpose.

234. Personnel expense

Personnel expense should include all expenditures by the personnel department for salaries and supplies and should also include the expenditures of this department in carrying on what is ordinarily termed welfare work. Under this heading will be included cost of classes for training employees, cost of medical and dental services, cost of maintaining reading rooms, recreation facilities, etc. It is essential that such work be kept under effective control if expenditures for such purposes are not to be excessive.

235. Financial expenses

The financial department of which the treasurer is usually the executive head incurs expenses in planning

and executing the financial program. In many cases the credit and collection departments are under the control of the treasurer, in which case the expense of maintaining these departments will be treated as a financial expense.

Financial expenses can usually be grouped under two major classes: (1) office expense; and (2) credit and collection expense. The first will include the salary of the treasurer and his assistants including the cashier and the cost of maintaining his office. The latter will include the cost of services and supplies of the credit and collection department.

There has been a tendency in the past to place the cost of maintaining the financial department under administrative expense. This tendency is probably due to the fact that the president in many small companies acts as treasurer.

Even when a treasurer is appointed he is regarded as an assistant to the president. It seems that, regardless of whether there is a separately organized financial department, the financial function is of sufficient importance to merit the showing of its costs as a separate expense. This is particularly important from the viewpoint of budgetary control, in which case it is the aim to have a budget prepared for each functional department.

236. Controller's expenses

The expenses of the controller are incurred in connection with the function of keeping the standards and records, and include those of the accounting, statistical and office manager's departments, and the expense item of establishing and carrying out the procedure of the budget and all functional departments.

237. Executive expenses

The executive expenses should include those which are incurred by those executives of the business who do not devote their entire services to any particular department, but render service to all the departments in the way of direction and supervision. This will include the salaries of the president and his staff assistants, and the cost of maintaining their offices. Where a general office is maintained which is separate and distinct from the functional departments, these expenses are frequently termed General Office expenses.

Unless care is taken to exercise control over such expense, there is a tendency for it to increase unduly. One reason for this tendency is that the president of the company is usually vested with the control of the expenditures incurred and it is somewhat difficult for him to act as criterion of his own expense. It is desirable that the amount of this expense be presented to the board of directors in such form that they can easily judge of its justification. The board of directors is the immediate superior of the president and is therefore the proper party to pass on his expenses.

The need for presenting these expenses to the board of directors for careful inspection is another argument against allocating them to the various operating departments, since such procedure tends to obscure the amount and to prevent a careful control of them. The treatment of these expenses as a separate and distinct classification also facilitates their budgeting.

238. Corporate expenses

Corporate expenses include those which must be incurred not because of any functions which the corpora-

tion exercises, but because of its existence as a corporate organization and its relation as such an organization to governmental bodies and to parties outside the corporate organization. These expenses comprise corporation fees paid to state government, capital stock taxes, directors' salaries and fees, expenses connected with the maintenance of stock registers and dividend records, and fees paid for professional counsel in connection with appraisals, business reports, and audits required by creditors. The laws of most states impose on corporations obligations in the way of making reports, the maintenance of records, and the payment of fees. In the preparation of some of these reports, such as income tax returns, and also in the preparation of reports to creditors, it may be necessary to obtain professional counsel from attorneys, accountants, and industrial engineers. These costs are obtained for the benefit of the business as a whole and should be shown as a special group.

In many businesses there is maintained a general group of expenses known as Administrative Expenses and in this group are placed (1) financial expenses; (2) personnel expenses; (3) executive expenses; and (4) corporate expenses. In such cases the items here termed corporate expenses are usually shown under the heading of General Administrative Expense. This method does not provide for an effective control of expense on the basis of responsibility which is necessary for both administrative and budgetary purposes. The terminology suggested in the foregoing discussion may not be the best possible, but the general procedure outlined is one which will provide a proper basis for effective administration of the expense problem.

Chapter XXV

**Control over Disbursements for
Expenses—Continued**

239. Need for expense budget

The preparation and enforcement of expense budgets are necessary in order:

1. To provide an effective control over the amount of the expenses of the several departments. It is essential, if a satisfactory profit is to be made, that the amount of the expenses be reduced to the minimum consistent with efficient service. To effect this it is necessary to plan the expenses to be made and to limit the expenses to those planned unless special circumstances make changes necessary.
2. To provide data making possible an accurate estimate of cash needs. The departmental expenses constitute a considerable part of the total disbursements of a business and must therefore be considered in the preparation of the financial budget.
3. To provide data necessary for the preparation of the estimated statement of profit and loss.

240. Requirements for budgetary control of expenses

To effect budgetary control of expenses it is necessary that a procedure be adopted which contains the essentials of the following:

1. That, before the close of any budget period, the executive head of each department or unit of organization shall prepare an estimate showing the anticipated

expenses of his department, or unit, for the next budget period.

2. That these estimates be used by the executive in charge of the budgetary procedure, with the probable assistance of the treasurer, in the preparation of a financial budget and an estimated statement of profit and loss.
3. That they be submitted by the executive in charge of the budgetary procedure, together with all other estimates, to the budget committee or to the board of directors, or to both; and that, after being revised by the budget committee or board of directors, an appropriation be made to meet the expenses called for by each estimate.
4. That the amount of each appropriation as determined by the budget committee or by the board of directors, be communicated to the executive responsible for the original estimate.
5. That a monthly report showing the status of each appropriation be made to the budget committee, or to the board of directors, through the executive in charge of the budgetary procedure.
6. That the original appropriation be not exceeded by any department without the permission of the budget committee or of the board of directors.

241. Preparation of expense estimates

To ensure the effective operation of the budgetary program, it is necessary that definite responsibility for the preparation and enforcement of the expense budgets be fixed. It is well to follow here the general procedure and have each estimate prepared by the executive who will be responsible for its enforcement after it is adopted. The sales manager and the production manager will be responsible for the preparation of the estimate of selling

and advertising expense and the estimate of manufacturing expense respectively.

In a manufacturing business the purchasing agent will be responsible for the preparation of the estimate of buying expenses. If there are assistant purchasing agents located at the factories, these will submit their estimates to the general purchasing agent who, after making such revisions as he thinks necessary, will combine them with his estimate and thus make the estimate for the company as a whole. In a mercantile establishment each department buyer will prepare an estimate of purchases to be made and will transmit it to the merchandise manager. The latter will combine these to make the estimate for the store as a whole.

The personnel manager will prepare the estimate of personnel expense. This estimate will include all expenses over which the personnel manager has control. He will submit this estimate to the executive in charge of budgetary procedure and it will be transmitted by him to the budget committee.

The treasurer will be responsible for the preparation of the estimate of expenses for the financial department. He will require the preparation of estimates by the head of the credit and collection department and by the cashier, and will use their estimates in preparing an estimate for the entire financial department.

The controller will be responsible for the preparation of the estimate of the expenses of his department. He will include the cost of maintaining all the operations over which he has line control, but will not include the cost of the operations over which he exercises only functional control, since the cost of these operations will be included in the estimates of the executives who exercise

line control over them. For instance, the controller has functional control of the operating procedures of the treasurer's department, but he will not include in his estimate the cost of carrying out these procedures since this cost will be included in the estimate of the treasurer.

The president is responsible for the preparation of the estimate of executive expenses. This duty he probably delegates to his staff assistant, and this assistant may employ the aid of other officers in the office of the president.

The estimate of corporate expenses will be prepared by an official designated by the president. This estimate may be prepared by the secretary of the corporation, since he is conversant with the relations which give rise to these expenses. In some cases this estimate is prepared by the treasurer, and when this practice is followed, care must be exercised to keep the estimate entirely separate and distinct from the estimate of expenses of the financial department as prepared by him.

242. Miscellaneous expense budgets

The expense budgets of most departments include only two groups of items: cost of supplies and cost of labor. If these are included in the stores and pay roll budgets, respectively, several of the expense budgets can be eliminated. If this plan is followed, it is customary to prepare a miscellaneous expense budget which will contain all the items of expense which are not included in the stores and pay-roll budgets.

243. Form of estimate

The work of the executives who are responsible for the consideration of the departmental estimates is greatly

facilitated if estimates are presented in a form which shows comparisons between the estimates and past expenses. Usually it is desirable that the form provide at least the information called for by the columnar headings shown in the following illustration.

| EXPENSE BUDGET | | | | Sales Dept. | | |
|------------------------------|------------------------------------|--------------------------|--------------------------------------------------|----------------|-----------------|----------------|
| ITEM | ESTIMATED AMOUNT THIS PERIOD | ACTUAL LAST PERIOD | AVERAGE OF ACTUAL FOR PAST FOUR PERIODS | DISTRIBUTION | | |
| | | | | FIRST MONTH | SECOND MONTH | THIRD MONTH |
| <i>Salesmen Salaries</i> | | | | | | |
| <i>Traveling Exp.</i> | | | | | | |
| <i>Advertising</i> | | | | | | |
| <i>Office Expenses</i> | | | | | | |
| <i>Office Salaries</i> | | | | | | |

By considering the estimates submitted in this form, the executives can see whether an increase of expenditures is called for, and, if so, can investigate to see whether this increase is justified. The estimates submitted by the various departments will show the salaries to be paid to the employees of these departments and will show also the amount of supplies to be used during the budget period. Supplies to be used by all the departments of the business are usually purchased by a central purchasing department. The purchasing agent buys these in the quantities which he thinks are most economical, and consequently, there may be at any time a considerable inventory of supplies on hand. The supplies used during any period will, therefore, not correspond to the supplies purchased in that period.

After the departmental estimates have been made, it is necessary that they be sent to the purchasing agent. On the basis of the estimated consumption by the various departments, the purchasing agent will estimate the pur-

chases which must be made and, taking into consideration the terms on which these may be secured, will determine the disbursements for supplies for each period. An estimate of disbursements is necessary as a basis for the preparation of the financial budget.

244. Monthly reports

To effect a proper control of the appropriations made for each department, it is necessary to have at least monthly reports which will show for each department a comparison between the expenditures of the department to date and the appropriation for the expenses of that department. Usually, the accounting department prepares a report showing the actual expenditures of each department and the executive in charge of the budgetary procedure prepares the report showing a comparison between the expenditures and the appropriation. A difficulty which may arise from this method is the failure of the accounting department to prepare the monthly report in sufficient time to provide for a current check upon the monthly expenditures of the departments. To be of service, comparative reports should be in the hands of the budget committee immediately after the end of the month.

If undue delay is caused by depending on the accounting department, it may be necessary to have each department make its report of expenditures direct to the executive in charge of the budgetary procedure.

245. Analyzing and collecting budget control data

In some businesses it has been found necessary to set up records independent of the accounting records by which to obtain the budget control data. The following

interesting description of a procedure by which this may be done is given by Mr. Joseph Danziger, in an article in the magazine "Administration":

By ordinary accounting methods we found that the exact summaries of expense disbursements were not available until the latter part of the following month. Nearly sixty days would therefore elapse before certain of the expenses incurred could be verified. It is obvious that a better method would provide a means whereby the controller could determine immediately what limitations should or should not be placed upon certain expenditures, and not compel him to wait until after an acute emergency threatened to develop into a chronic weakness.

The general manager, therefore, required a budget-control which would reflect the facts regarding expenses at frequent intervals. Our system of branch and factory accounting provided for separate sets of books for each organization, and this made the difficulty of securing the desired summaries from the accounting records all the greater. It was apparent that we would have to depart from conventional accounting methods and secure our information as promptly and frequently as the situation required, relying on an ultimate reconciliation with the books to test the accuracy of our information.

Since a daily report was not impossible, in theory, this was at first planned. An analysis of this proposal, however, soon developed fatal objections. It would have called for more labor to keep such a record than the results would justify and the daily report would show such violent fluctuations that it would be impossible to grasp its significance without elaborate analysis.

The ideal budget control record should be self-explanatory and reveal at a glance to the controller or to any interested executive, who might not be so well versed in accounting methods, just what was going on in the business and why certain changes were called for.

A week was finally selected to be the best standard of time. It is fairly long, reasonably frequent, and enables each department or bureau to report all its activities up to and including Saturday closing time. The serious objection to the week is

that its end rarely coincides with the last day of the month and therefore a reconciliation with the books as at the close of the month would not be possible. Therefore, each month was divided into a number of unequal periods, all but one of which would terminate on Saturday. If the days preceding the first Saturday in the month constitute a major fraction of a week, they are regarded as the first period. The three full weeks then follow and the days following the last Saturday are annexed to the previous week if they are insufficient to make up a major fraction of a week. Thus in nearly all cases there are five periods to each month. The accompanying calendar illustrates the

| CALENDAR | | | | | | |
|----------|-----|------|-----|-------|-----|-----|
| SUN | MON | TUES | WED | THURS | FRI | SAT |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

method. The first period, being over half a week, ends on Saturday, the fifth. There follow three full weeks, and the last period runs from the 28th to the 31st, inclusive. The first period of the following month would include the first two days annexed to the first full week. This requires all fixed charges and budget estimates to be prorated according to the irregular periods.

The chief difficulty lay in providing a means for obtaining a report of every expense charge at the close of each of the arbitrary periods. It was manifestly impossible to obtain this information from all the branches and factories by ordinary accounting methods unless we wished to create a very large force to take care of this one record.

Another objection to relying on such accounting records was that we desired to have every disbursement reported during the period for which it was incurred, regardless of when it was

posted. Lighting expense is not paid until long after the light has been used, or a printer may not present his bill until some time after the supplies have been used. On the other hand, rent is paid in advance and some pay-rolls are weekly, some semi-monthly, and others monthly. How then were we to create a standardized method of reporting current expenses as fast as they were incurred and without resorting to a duplicate set of records?

The problem was rendered all the more complicated because of the essential diversity of disbursements. Some of the obstacles we had to overcome were characteristic of our particular business, but as the same general principles apply to all businesses only few of these perplexities need to be mentioned. For instance, certain publicity expenditures are partly charged for supplies taken from stock, partly for special purchases, and the greater part for contingent contracts. In some cases the entire charge would properly apply to the period when it was made, but there are many others in which there is a provision for an extended time and the entire amount would have to be prorated over the several periods to which it applied. The method of controlling supplies is simple, and is fully explained in the following paragraphs. Special purchases are more difficult. If the useful life of a purchase were two months, it would, of course, be good accounting practice to charge the cost as soon as possible; but this is not true of the budget control record which is supposed to reflect the exact expenditure for each arbitrary period.

It would have been possible to analyze each purchase requisition, but the process would have involved an enormous amount of clerical work. It was therefore decided to provide a record on the purchase requisitions so that each one should show whether the purchase was to be used immediately, or, if not, the beginning and ending of its estimated useful life. When the purchase is ordered, the purchasing department should immediately report the amount and the period of useful life. The amount is prorated by the budget control clerk and recorded on his file cards. In making up the budget control record for a period one finds it only necessary to go over these cards and add to the various accounts such purchases as have been made for that definite time.

Contingent contracts are peculiar, but possibly not so rare as one might think. In our experience they are incurred for publicity or sales promotion purposes and involve arrangements with artists or engraving houses. It does not appear possible to arrive at an exact amount at the time the contract is made and what is more uncertain, the artist frequently fails to send in a bill until he needs the money, the latter contingency depending entirely upon his artistic temperament. Frequently a bill is presented weeks or even months after the matter should have been settled.

Although these items are relatively small compared with the total expenditures, they constitute an important element in certain accounts, and a proper analysis of these accounts is impossible in the absence of contemporary data. It was, therefore, provided that each department head should furnish an estimate of all contracts undertaken by his department, with the period of estimated life of the purchase. This serves a double purpose, for if the department head estimates too low, it soon becomes apparent by a discrepancy between the budget control record and the books of account. It is evident then that someone is charging him more for services than, in his judgment, they are worth. By similar decisions from case to case, we finally arrived at the correct solution for all of our expenditures.

What at first appeared to be a riddle of the Sphinx presently proved itself to be as simple as the egg of Columbus. It was not in vain that the author had spent a year of his life among Washington bureaucrats of the Income Tax Unit. "Collection at the source" was the solution. Uncle Sam does not care when, if ever, you clip your coupons and cash them. He gets his taxes at the source and your records are a check on the transaction.

This principle applied to the budget control is perfectly sound, though to be sure, not every business may permit its application in exactly the way we have found it most efficient. A good analyst can readily determine the best way to accomplish his aim so long as he keeps in mind the principle of "collection at the source."

In the classification of sources, I have followed the practice which we found adapted to the business. The budget control

record is too new to permit of any other empirical treatment and I have been unable to formulate a theory of compiling the record which will apply infallibly to every situation. After a thorough search of the economics division of the library and inquiry among a number of large houses in the city, I became convinced that our method is unique. In devising the record mistakes may well have been made, but all pioneers are susceptible to what later experience proves to be errors. Nevertheless, it is apparent that the budget control record is an economic analysis rather than an accountancy record. The treatment must be along the broad principles of economics rather than the application of those principles as adopted by accountancy.

According to our experience expense disbursements are separated into six classifications:

1. Supply requisitions
2. Purchase requisitions
3. Petty cash disbursements
4. Pay-rolls
5. Journal vouchers
6. Fixed charges

The distinction between supply and purchase requisitions may not always be made. In our practice the former are handled by the stockroom, the latter by the purchasing department. It was also necessary to distinguish between purchase requisitions chargeable to an inventory account and those chargeable to an expense account. In order to avoid confusion it was required that all purchase requisitions which required goods for immediate use must record the expense account to which the charge was to be made. Otherwise the purchase would be assumed to be for stock and could not be delivered without a subsequent supply requisition. This put a stop to the easy-going method of omitting the coding of a requisition until after the invoice had been presented to the department head for his O. K. The summary sheets kept in the stockroom, the purchasing department, and the cashier's office disclose the disbursements under the first three classifications. The totals are taken off for each account on the last day of the period and forwarded to the budget control clerk.

The other classifications offer more or less trouble according to the nature of the business, but the fundamental principles are the same in all cases. An allocation of disbursements must be relied upon to reflect the true facts with reasonable accuracy. Such discrepancies as may occur should either be ignored altogether, or, if they are important enough, an adjustment made during the following period. If this suggestion seems too inaccurate, the reader must not forget that the budget control is not an accounting record but an economic analysis intended to serve as a mentor to the administration. It bears the same relation to the true accounting record that the preliminary count at an election bears to the official count. So long as the budget control record discloses with reasonable accuracy how much was spent for any one account or group of accounts the management can wait for the monthly statement to ascertain the exact expense to a penny.

For a full week we use the weekly pay-rolls, and for a fraction of a week the pay-roll of the previous week is adopted for the days following. This method is, of course, productive of slight inaccuracies which may be adjusted in the period following their discovery. The same method applies to monthly and semi-monthly pay-rolls. The last available pay-roll is adopted as the pay-roll for the following periods. Of course, it would be possible to get a very accurate estimate of pay-rolls at the close of the week, but the additional labor necessary to produce this information does not appear to be justified. Even if this method were carried through without any adjustment the total discrepancy would not be great as it tends constantly to correct itself.

Journal vouchers affecting profit and loss are summarized for each period by the chief accountant or by one of his subordinates. It is possible to anticipate some disbursements such as insurance or interest at the beginning of the month, and to make an adjustment for any error in the estimates in the succeeding month. The person in charge of the budget control record should be intelligent enough to discriminate between those charges which are susceptible to estimate and those which are casual.

On the other hand, it has been advanced that such charges as depreciation, which are constant, or credits to reserve for bad

debts, which are solely in proportion to sales, need not appear on the budget control record. However, it is better that every disbursement should be disclosed by the record so that the totals shall show the exact deduction from gross profits. Then, too, the same argument might be applied to stock and shipping expenses. If we ship no goods we have no charges for paper and string, just as there would be no charges for reserve for bad debts. In order to avoid this sort of *reductio ad absurdum* it is best to include every item of expense, especially as in this way only can we arrive at an estimate of net profits at the close of each period.

Under "fixed charges" are included all expense items which cannot be reported from any other source enumerated above. The classification includes all items of overhead which are not subject to the supporting vouchers. All of them may be accurately predetermined by the proper executive. In this classification we include publicity items that are contracted for a year in advance, administration salaries, if it is decided to have these appear in the record, and whatever is of such a nature as to permit its predetermination.

The budget control record contemplates two things: first, to furnish a weekly summary of expense disbursements with sufficient accuracy to be useful in determining the policy of the business; and secondly, to accomplish the former with the least effort and without interrupting ordinary accounting routine. The data are therefore collected from the most available sources without passing through the customary accounting and auditing channels. For instance, it would be possible to use the voucher register as a source; but if we did this, although a little time would be saved and we would be sure that all requisitions had been properly coded, the information would not be so promptly rendered, and it would not be properly allocated in accordance with the periods of time to which each entry would apply. As it is, the disbursements appear in the budget control record long before the supporting requisitions have been audited and registered. Of course, this does not entirely eliminate the tendency to errors if the requisitions have been improperly coded, but the main facts are correct.

The record forms are ruled in double column, each pair showing the budget estimate and the actual figures side by side. The left-hand pair of columns are for estimated and actual sales. Each account in the group follows in sequence and the last pair of columns discloses the actual and budgeted totals for the group and the percentages of estimated expenses to estimated sales in comparison with actual percentages. All estimated amounts are in black, and actual figures in green or red according to whether they are favorable or unfavorable. Of course this color scheme is purely arbitrary. At the close of each month the totals for the year to date are brought down showing to what extent any individual account or controlling account has varied from the estimate. This, of course, is of more importance than the fluctuations during part of a month or even an entire month.

If the record is properly kept, the total percentages should disclose a net profit very close to that reported a few weeks later in the profit and loss sheet. This is the true test of the accuracy of the system.

With this record in hand, the chief executive possesses a chart which tells him just what course his business is taking. Even of greater importance is the fact that he can obtain this information early enough to stop any leaks that might prove serious if permitted to continue. He can see at a glance how much sales differ from the estimated amount. He has a résumé of the total expenses for the week, or he can immediately refer to the smallest item composing the total, and finally the comparative percentages tell him whether he is sailing in safe waters.

The budget control record is far from perfect as it stands today. But even as it stands it is more than a chart for the business pilot. It is the first radical departure from ancient accounting methods since the early Renaissance when the old Lombard bankers invented and used double-entry bookkeeping.

246. Review and summary

In summary form, the procedure necessary for the preparation and execution of an expense budget is as follows:

I. Classification of expenses

1. The setting up of an expense classification which corresponds to the classification of activities maintained by the business as shown by its chart of organization
2. The allocation of indirect expenses in such a manner as to indicate the responsibility for incurring them
3. The establishment of subclassifications under the major classes which will enable the definite fixing of responsibility and a comprehensive explanation of variations

II. Preparation of budgets

1. The preparation of an estimate of the expenses of each department for each budget period by the executive heads of the department
2. The transmission of this estimate to the budget committee and to the board of directors for consideration and approval
3. The making of an appropriation by the budget committee or by the board of directors to meet the estimate as approved

III. Control of budgets

1. The preparation of a monthly report showing a comparison between the actual and estimated expenditures for each functional department
2. The consideration of this report by the budget committee or by the board of directors, and the making of such revisions in the original appropriations as may be found necessary

Chapter XXVI

Duties of the Treasurer

247. Relation of treasurer to financial control

The financial executive in most businesses is termed the treasurer. It is desirable, therefore, that we consider the powers, duties, and obligations of the treasurer in order that his relation to the financial management of the business may be understood.

248. Duties of the treasurer

The duties of the treasurer are not uniform, but vary from company to company. They are usually determined in three ways:

1. By the state statutes
2. By the by-laws of the corporation or by the resolutions of the board of directors
3. By the general orders of the president

The statutes of some states indicate in a general way the powers and duties of treasurers of corporations which are organized under the laws of the states. In most cases, however, these statutes do little more than to indicate the general duties of the treasurer and to state certain obligations which are imposed upon him.

The by-laws of a corporation usually outline the duties of its treasurer. In some cases they do so in considerable detail. The following quotation is an illustration of such by-laws:

Section 5. Treasurer. The treasurer shall have the custody of and be responsible for all moneys and securities of the Company; shall keep full and accurate records and accounts in books

belonging to the Company, showing the transactions of the Company, its accounts, liabilities, and financial condition, and shall see that all expenditures are duly authorized and are evidenced by proper receipts and vouchers. He shall deposit, in the name of the Company, in such depository or depositories as are approved by the directors, all moneys that may come into his hands for the Company's account. His books and accounts shall be open at all times during business hours to the inspection of any director of the Company.

The treasurer shall also endorse for collection or deposit all bills, notes, checks, and other negotiable instruments of the Company; shall pay out money as may be necessary in the transactions of the Company, either by special or general direction of the board of directors, and on checks signed by the president and himself; and shall generally, together with the president, have supervision of the finances of the Company.

He shall also make a full report of the financial condition of the Company for the annual meeting of the stockholders, and shall make such other reports and statements as may be required of him by the board of directors or by the laws of the State.

He shall give bond in the sum of five thousand dollars, with sureties satisfactory to the board of directors, for the faithful performance of his duties and for the restoration to the Company, in event of his death, resignation, or removal from office, of all books, papers, vouchers, money, and other property belonging to the Company that may have come into his custody. He shall receive such compensation, not exceeding eighteen hundred dollars per annum, as may be fixed by the Board of Directors.*

The duties of the treasurer as indicated by the foregoing typical quotation may be summarized as follows:

1. The treasurer is custodian of the company's moneys and securities.
2. He has charge of all records relating to the corporate transactions of the company and must see that expenditures are duly authorized.

*Conyngton, "Corporate Organization and Management."

3. He must deposit all company funds in the company name.
4. His books must be open to the inspection of the directors at all times.
5. He has power to endorse all negotiable instruments of the company.
6. He pays out money of the corporation whenever directed to do so.
7. In conjunction with the president, he has supervision of the finances of the company.
8. He makes financial reports to the stockholders, to the board of directors, and to the state, when required to do so.
9. He must give bond for the faithful performance of his duties.

In some cases the duties of the treasurer are not stated in the by-laws or, if so stated, are not given in sufficient detail to indicate all the duties which he is supposed to perform. In such cases his duties may be outlined by general orders issued by the president of the corporation. The following is an illustration of such an order, which defines the duties and powers of the treasurer of a large corporation:

A. Definition of jurisdiction

The jurisdiction of the office of treasurer as established and defined in the by-laws of the Company is hereby further defined to include the following functions:

1. Credits and collections

a. Credits

- (1) Passing on the credit of all customers either on individual transactions or through OK lists
- (2) Passing on the credit of vendors on request
- (3) Supervising the methods of gathering credit data by the sales force
- (4) Reviewing the sales terms of the Company from the standpoint of credit
- (5) Furnishing other companies with data as to customers' credit

- b. Collections
 - (1) Determining the manner and place of remittance to the Company
 - (2) Receipting all vouchers drawn in favor of the Company, and endorsing for it all incoming drafts and checks
 - (3) Preparing and chasing all collection "duns," drawing all drafts drawn by the Company against its debtors, conducting all personal collection work and all arrangements for collecting through agencies or attorneys
- 2. Custody and maintenance of funds
 - a. Depositing all cash receipts and borrowed funds
 - b. Setting up and maintaining all petty cash funds
 - c. Making all transfers of funds between Company depositaries
 - d. Negotiating all short-time loans, under the borrowing limits set by the president, necessary to meet the current obligations of the company
- 3. Disbursements
Disbursing of cash, checks, drafts, bills of exchange, notes, bonds and bond interest, stock certificates, and dividends, subject to the countersignature of the president, a vice-president, or director in the case of stocks, bonds, and notes
- 4. Taxes
- 5. Insurance
 - a. Determining the amount of insurance and kinds of policies required to afford all necessary insurance protection to the Company, as regards surety bonds and adhering to the instructions of the directors as to the basis of valuation in the case of fire and marine insurance
 - b. Placing such insurance
- 6. Real estate
Purchasing, mortgaging, leasing, renting, and selling all Company real estate, subject to the approval of the president where the transaction exceeds \$100,000 in amount
- 7. Sale of securities
 - a. Recommending for decision by the board of directors as to the need for and form of all new security issues
 - b. Selling, either direct or through banks or syndicates the Company's securities, including the publication of all Company literature and advertising connected therewith

- c. Conducting all relations with the Company's registrars and transfer agents
 8. Purchase of securities
Purchasing all outside securities held by the Company and buying Company's securities, as authorized by the board of directors
 9. Financial statements
Preparing of published reports of the financial condition and progress of the Company, other than those connected with the issue of securities.
 10. Custody of financial documents and corporate seal
Custody of all title-vesting and negotiable documents, representing the property of the Company, and the corporate seal
 11. Financial budget
Determining the financial requirements of the Company and approving major appropriations as to availability of funds
 12. Financial standards
Developing financial standards with special reference to the establishment of sound relations between current liabilities and cash, working and total capital, working capital and sales volume, gross profits and sales volume, net profits and fixed and continued charges, capital stock and bonded indebtedness, capital stock and sales volume, etc.
- B. Organization
In the performance of the above stipulated functions, the treasurer will be subject to the direct executive authority of the president at all times. The treasurer will himself exercise direct executive authority over the assistant treasurers at the eastern and western divisions, respectively, and indirect functional control over the organization units in charge of such functions in the Company's works and selling units
- C. Designation of.
Mr. is hereby designated as treasurer, effective as of the date of this order.
(Signed)
President.

The treasurer acts under instructions from the board of directors of the corporation. He is their agent in all matters which have to do with the finances of the organization. He must act in accordance with their instructions and in accordance with the instructions of the president,

chosen by them. It rests entirely in the jurisdiction of the directors to choose the officers of the enterprise and to define their duties. It may be stated therefore that the treasurer, in order to ascertain his duties, should proceed as follows:

1. Consult the statutes of the state
2. Consult the by-laws of the corporation
3. Consult the resolutions of the board of directors
4. Consult the general orders which have been issued by the president of the company

249. Powers of the treasurer

It is a somewhat difficult thing to distinguish between the powers and the duties of a treasurer. In the by-laws of some corporations they are stated jointly, as is indicated from the following quotation of the by-laws of the United States Steel Corporation:

Section 7. Powers and duties of treasurer. The treasurer shall have custody of all the funds and securities of the Company which may have come into his hands; when necessary or proper he shall endorse, on behalf of the Company, for collection, checks, notes, and other obligations, and shall deposit the same to the credit of the Company in such bank or banks or depository as the board of directors or the finance committee may designate; he shall sign all receipts and vouchers for payments made to the Company; jointly with such other officer as may be designated by the finance committee, he shall sign all checks made by the Company, and shall pay out and dispose of the same under the direction of the board or of the finance committee; he shall sign with the president, or such other person or persons as may be designated for the purpose by the board of directors or the finance committee, all bills of exchange and promissory notes of the Company; he may sign, with the president or a vice-president, all certificates of shares in the capital stock; whenever required by the board of directors or by the finance committee,

he shall render a statement of his cash account; he shall enter regularly in books of the Company, to be kept by him for that purpose, full and accurate account of all moneys received and paid by him on account of the Company; he shall, at all reasonable times, exhibit his books and accounts to any director of the Company upon application at the office of the Company during business hours; and he shall perform all acts incident to the position of treasurer, subject to the control of the board of directors or of the finance committee.

He shall give a bond for the faithful discharge of his duties in such sum as the board of directors or the finance committee may require.

In the performance of the duties imposed upon him, the treasurer has the implied power to do those things which are necessary in order to perform these duties. For instance, if the volume of the financial transactions of the business is such as to make it necessary, he may appoint assistant treasurers to assist him in performing his duties unless the board of directors by resolution or by means of the by-laws have reserved these powers unto themselves. In any case, considerable discretionary power is left to the treasurer. His powers are exercised under the supervision of the president of the corporation.

250. The treasurer's bond

The treasurer is required to provide a bond for the faithful performance of his duties. This bond may vary in tenor according to the particular conditions, but usually it requires three things:

1. The faithful performance of the treasurer's duties
2. The safety of the corporate funds and other property entrusted to his care
3. Their due return on expiration of his term of office or any prior time on legal demand

The statutes of many states require that the treasurer shall give bond and, in addition, the by-laws of practically every corporation require that such a bond be given. The purpose of a bond is to guarantee the good faith of the treasurer. The persons signing the instrument agree by so doing that in case of default or dishonesty on the part of the treasurer they will pay the amount called for in the bond. No more is demanded of the sureties than the bond calls for. If they guarantee the absolute integrity of the treasurer and that he will faithfully perform his duties, they are held liable to that extent. The bonds given for treasurers are of two kinds:

1. **Personal bonds.** The personal bond is generally sweeping in its nature, covering any loss occasioned by defalcation or dishonesty on the part of the treasurer and providing also for the proper restoration to the company, when legally demanded or at the expiration of the treasurer's term of office, of all moneys, papers, vouchers, documents, books of account, and other property belonging to the company then in his hands.

2. **Surety bonds.** The surety company bond is similar in its general nature to a personal bond, its carefully restricted liability and the fact that it is signed by a surety company instead of by individuals constituting the only material difference.

Obtaining bonds—The methods of obtaining the two kinds of bonds differ materially. The personal bond is usually given by a personal friend or friends of the treasurer and involves no expense. It is important, however, that both the financial standing and the moral integrity of persons giving such a bond be carefully investigated.

On the other hand, the principle underlying the surety bond is that the company assumes the risk as a disinterested body much, for instance, as an insurance company takes over the risk for loss by theft. Consequently the surety company must protect itself by requir-

ing certain information in regard to the individual desiring the bond. In his preliminary application for a surety bond the treasurer is usually required to give his past record in this line of work and proof of his business ability. This information is later supplemented by an investigation of his character by the company. In return for the surety company's assuming the risk, the treasurer must pay a fee for the service.

Obligation of bondsmen—The significant obligation of the personal bondsmen, as has been indicated already, is that they are liable for the full amount of the bond. The responsibility of each of the men going bond may be less than the total amount of the obligation. That is, the extent of the liability of the parties to the bonding agreement depends upon the provisions of the bond. For instance, if the signers guarantee severally, then each one may be held liable for the entire amount of the bond, but, if the signers guarantee jointly, then each one is liable for his proportionate part of the bond. If they sign jointly and severally then they may be held liable either severally or jointly.

The liability of the bondsmen does not expire until the bond is cancelled or until it legally terminates, and is effective as long as the treasurer is in office. The liability may extend "both during the term for which he has been elected and during such further time as he may continue therein, whether by re-election or otherwise, etc." The bond may be terminated either by death or by the voluntary resignation of the treasurer.

251. Treasurer's liability

By accepting the office of treasurer, the individual undertakes a legal responsibility to the corporation.

Although all officials accept a moral obligation to perform their duties in the most efficient manner possible, the treasurer, by virtue of his office, enters into a relationship of principal and agent, between himself and the corporation. The nature of this relationship may be understood by the following quotation from Mr. Conyngton:

Thus, if the treasurer loses a portion of the company's funds through careless handling, he is responsible to the corporation. If he makes an official report to the stockholders which is false in some material respect and the stockholders act upon this false information and lose money thereby, the treasurer is personally liable to the individual stockholders by whom these losses are incurred. Or if he misrepresents the financial status and ability of the corporation to an outsider in order to induce him to give credit to the company, he is liable to such outsider for any losses incurred as a result of his false representation. In many states, if he fails to make certain specified reports, he is liable to fine. In all states, if he embezzles the corporate funds or uses his official position to defraud, he is subject to a criminal prosecution

In addition to the common-law liabilities, there are in some states penalties for refusal to allow the proper inspection of books; for failure to make certain reports, for permitting stockholders to withdraw any part of their investment in the corporation and for allowing other impairments of the capital stock. Most of the things thus penalized are in themselves morally indefensible.

The liability of the treasurer is thus seen to extend to the following:

1. **Neglect of duty.** The neglect of duty on the part of the treasurer has to do with the receipt or the distribution of corporate funds. If, for example, through failure on the part of the treasurer to place the corporate funds in the proper depositories, the same are stolen, the treasurer may be held liable for neglect of duty. Or,

if the treasurer fails to make the reports required by the board of directors, he may be held liable for non-performance of duty. We have seen above that it is usual to require that the treasurer give bond for the faithful performance of his duties. In case of failure to perform his duties properly, the bond may be forfeited. Since the treasurer is an agent of the corporation and is appointed and acts under the direction of the directors, he is responsible to them and not to any members of the corporation.

2. Improper performance of duty. The treasurer is liable to the board of directors for the improper performance of his duties. For instance, he may permit the payment of corporate funds without proper authorization, in which case he might be held responsible for the full amount. He may fail to deposit the corporate funds in the corporate name, which would extend his personal liability. The improper performance of duty on the part of the treasurer is not of frequent occurrence.

3. Non-authorized acts. It is an ordinary principle of agency that a principal is not held liable for the unauthorized act of his agent. The agent, however, may be held liable to the party who suffers the loss whether it be an individual or a corporation. Such is the liability of the treasurer acting as an agent. There are many acts which may be classified as being within the apparent scope of the treasurer and for which, if the treasurer properly performs them, the corporation must be held responsible. It may be that the acts are not ordinarily performed by the treasurer, but if the directors lead the public to believe that such powers have been delegated to the treasurer, they will be compelled to answer for that officer.

4. Illegal acts. The illegal acts for which the treasurer may be held are, first, fraudulent acts. Fraud is the misrepresentation of a material fact upon which a person acts to his detriment. The laws of all the states make provisions for the punishment of fraud and insist that the individual damaged be remedied for his loss, and it

is not infrequent that both fines and imprisonment are directed against the offender. The offense may be either against the individual or the state.

Besides fraudulent acts, the illegal acts of a treasurer may extend to criminal acts, such as embezzlement. These acts are intended either as a benefit to the treasurer or for the welfare of the corporation, and either the individual or the corporation, or both, must suffer the responsibility. If the criminal acts of a treasurer are done in his own behalf, then he may be held liable the same as any other person. If the corporation commits the acts and the treasurer is responsible or takes part in the performance of the acts, he is liable to fine or imprisonment or both.

252. Treasurer's relation to other officers

It may be well to review the relations of the treasurer with certain other executives of the corporation. As the agent of the directors, the treasurer is responsible to them for his acts. Consequently he is not bound by the rulings of the stockholders. Any officer of a corporation who receives his appointment by vote of the board of directors cannot be called to account for his performance of duty by the stockholders, unless there is some special provision in the by-laws to that effect.

Therefore, the treasurer must keep in mind his relation to the directors. He must not ignore their authority unless he is compelled to do so by the provisions of the charter or of the by-laws. If no special restrictions are in existence, the rulings of the board of directors are final. If, as it sometimes happens, the directors are allowed practically unlimited power in changing the by-laws, their jurisdiction over the treasurer is complete; the only authority superior to their power would be a statutory regulation.

The powers of the board of directors do not extend, however, to the members of the board, acting as individuals. A member may have certain powers in conjunction with the other members of the Board, but it does not follow that he has them when he acts as an individual director. For example, an individual director may inspect the books of the company, but he cannot direct the payment of corporate money. The attitude of the directors toward the treasurer must be that of a unified body exercising certain specified and defined powers.

Powers of finance committee—It sometimes happens that the board of directors delegates its duties in regard to the treasurer to a finance committee. Such a committee was mentioned in the excerpt from the by-laws of the United States Steel Corporation. It takes over those powers and duties of the board which relate to the financial affairs of the corporation, and so it becomes directly the body authorized to control the acts of the treasurer. In order to secure a correlation and continuity of policies, the treasurer, who is a member of the board of directors, is usually made a member of the finance committee also, and, in such an arrangement, the authority over financial matters is likely to fall largely into the hands of the treasurer. It can be stated as a general principle that it is incumbent upon the treasurer to work in close accord with the members of the finance committee in order that the financial affairs of the corporation may be carried on harmoniously and smoothly.

Duties of auditor—There are other officers whose activities are closely related to those of the treasurer. The duties of the auditor are not far removed. In the large corporations, unless the by-laws of the company specify the respective duties of the auditor and the treas-

urer, there is very likely to be conflict of authority between them. In general, it may be said that the duties of the auditor have to do with the supervision of the corporate accounts. The actual receipt and payment of corporate funds still remain with the treasurer. The auditor may direct the payment; the treasurer does the paying.

In small corporations an auditor merely investigates the books from time to time, in order to see that they are being conducted according to the methods established by the accounting department. The books of the treasurer, as well as those of the corporate bookkeepers, should be open to the inspection of the auditor so that he may the more easily prepare his report to the board of directors.

There ought to be the utmost harmony between the president and the treasurer. In our enumeration of the duties and powers of the treasurer, we noted that the treasurer and the president have supervision over the finances of the company. Of course the president is the superior officer, and the functions of the treasurer are to some extent carried on under his direction. Legally, however, the board of directors, acting for the entire body of stockholders, is the one group which can compel a treasurer to follow any particular line of procedure. The president is in the same position as the treasurer in the sense that both officers are appointed by the board of directors and are responsible to it for their acts. It is only in the administration of the corporation that the president demands and enlists the co-operation of the treasurer.

253. Treasurer's reports

As an agent of the board of directors and the custodian of the funds of the corporation, the treasurer must

make reports showing his disposition of moneys and his use of the various powers assigned to him. The important reports of the treasurer are of two kinds: (1) reports to shareholders; and (2) reports to directors.

A report that is given to the shareholders of a corporation is invariably general in its nature, because some of the matter concerning the activities of a company is obviously not public property, and because most of the persons in interest want to know only about the status of the business. The treasurer's report to the shareholders usually contains a statement of earnings accompanied by a balance sheet, showing totals of fixed and floating, or current, assets or showing fixed and floating assets in detail. A profit and loss statement, either in general or in detail, may also be shown, indicating the net profits or loss of the corporation.

The report to the shareholders is made by either the treasurer or the president. If made by the president, it will include matter submitted by the treasurer. The board of directors decides what the report shall contain.

In contrast to the report to the shareholders, the treasurer's report to the directors must be specific in its statement of the financial condition of the corporation. Accordingly, there must be included an account of the source and amount of moneys received, the amount and nature of moneys disbursed, the earnings of the company, and the expenses for the period reported upon, and the assets and liabilities at the end of that period. Since the directors cannot make decisions in regard to the future financial policy of the corporation without knowing all the conditions at the present time, it is important that any further information which may explain the formal reports or may supplement the more usual data pre-

sented would also be submitted to the directors. Besides a yearly report, the directors usually require semi-annual and quarterly reports and monthly statements of the condition of the company.

Form of report—With reference to the form of these reports, it is desirable that they be stated in the most effective way possible. Accordingly, the comparative form has come to be largely used. This form makes it easy to compare the results of different periods and thus makes possible the drawing of inferences and deductions in regard to the business for the coming period. Such comparisons may be made either between monthly, quarterly, yearly, or other periods of time desirable for the particular company in mind, or between various elements of the financial statements, as receipts and disbursements, gross profits, operating costs, and the like.

VI. Cash Control

Chapter XXVII

Estimating Cash Requirements

254. Relation of cash requirements to financial control

It must be obvious that there is a definite distinction between the capital requirements and the cash requirements of a business. The capital includes all the property, both tangible and intangible, which is used in the conduct of the business. In most businesses, only a small part of this capital is at any one time in the form of cash. However, a certain amount of cash is at all times necessary in order to carry on the operations of the business. It must be remembered that the demand for cash is an imperative demand, and, when it is needed, disastrous results are likely to occur if it is not forthcoming. It is especially necessary, therefore, that plans be made which will ensure the necessary amount of cash. It is the purpose of the present discussion to explain how the amount of cash needed in the operations of the business may be determined and how control over its use may be exercised.

255. Nature of the problem

In order to make the distinction between working and fixed capital, it is necessary to differentiate between fixed assets and current assets, and fixed liabilities and current liabilities. This distinction is made largely on the basis of turnover. An asset with a slow turnover is termed a fixed asset, while one with a rapid turnover is

termed a current asset. Liabilities are classified in the same manner.

This method of classification is very useful in many cases, but it sometimes leads to a confusion of thought. Because any particular piece of merchandise will presently be converted into cash again, it is felt that it is somehow a less permanent form of investment than a building. Bankers will often feel that if they lend money for the purchase of goods that are shortly to be resold, "they can see their money coming back." But if a concern never allows its merchandise inventory to get below a certain amount, say \$10,000, that \$10,000 is just as truly a permanent investment in the business as is the cost of the longest-lived of its permanent assets. The same is true of current liabilities. Few concerns ever pay off all of their short-time loans at once. A business that always owes at least \$20,000 on short-time loans, although it may clean up its account at each bank once a year, has, in its commercial loans, a permanent investment of \$20,000. The large packing houses of Chicago are extensively financed on this basis.

Permanent assets distinguished from permanent investments—In view of this confusion between permanent assets and assets which involve a permanent investment, it seems desirable to set up a second distinction, quite independent of the one we have just discussed. During any particular season a given asset or liability, whether permanent or current, whether an accrued or a deferred item, may vary in amount. The proprietorship may change also. Of course the variations between different assets may not be all in the same direction at the same time, so that some will serve to offset others; and the same is true of liabilities-and-proprietorship. For the

purposes of financial administration, therefore, the changes in any single asset or liability or proprietorship item (with an exception to be noted presently) are of little or of no significance; what we are interested in are the variations in the totals. We will therefore speak of the minimum total assets of a business during the period under consideration, such as a year, as the constant assets of that business, and the amount of the excess as the variable assets. In analogous fashion we can define constant and variable liabilities and proprietorship. Thus, if the balance sheet of the John Smith Manufacturing Company on October 1, 19 , shows

| | |
|----------------|--------------|
| Assets | \$100,000.00 |
| Liabilities | 60,000.00 |
| | <hr/> |
| Proprietorship | \$ 40,000.00 |

and the lowest value for the total assets during the year is \$80,000, this will be the amount of the constant assets and also of the constant liabilities and proprietorship. The variable assets and also the variable liabilities-and-proprietorship will be \$20,000 on October 1. The variations in the proprietorship total, taken by itself, will not be large ordinarily. It will increase gradually through an accumulation of profits and then drop off at the end of each quarter when dividends are declared. Moreover, it is not normally subject to administrative control. In this respect it stands in contrast to the position it occupied in the problems we considered in previous chapters. We may think of the problems of seasonal financial administration as having to do with the preservation of the balance between variable assets and variable liabilities and proprietorship, as "keeping the balance in the balance sheet." The items which may be thought of as

preserving this essential balance, and the ones with which we are here particularly concerned, are cash and short-time loans from banks. The day-to-day and hour-to-hour fluctuations are met out of the cash balance; the seasonal fluctuations proper are met primarily out of commercial loans.

It is clear that the variable assets and the variable liabilities and proprietorship will be zero, that is, they will be at the minimum, at least once during the year; but during the busy season they may amount to a considerable portion of the total. It is this maximum amount of variable assets, which is reached either during or just after the busy season, and the corresponding maximum amount of variable capital to be raised by commercial loans that are the significant features. We will call the maximum requirement the financial peak load of the season.

256. Alternatives to bank loans

There are a number of possible ways of meeting or avoiding, at least in part, this financial peak load, besides that of establishing a line of credit at a commercial bank. A company which maintains a sinking fund will usually arrange to make additional investments in the fund during off-peak periods. It is perhaps worthy of mention that greater size in a business, where it implies a fairly variegated activity and territory, serves to diminish the amount of the peak load. The fact that a large concern's requirements in the way of bank loans are small in comparison to its credit puts it in a strong position in time of stringency. Closely allied to the practice of establishing a line of credit at a bank is that of discounting negotiable instruments with a bank or commercial-

paper broker without making arrangements in advance. Some concerns prefer to use the commercial-paper house first, thus retaining their line of credit at the bank as an emergency reserve. Another form of reserve is to hold an investment in some reliable securities; but these are likely to be least liquid at the time when they are most needed. It may be desirable also to mention in this connection the failure to take cash discounts. The assignment of accounts is another practice which is pretty generally disapproved.

257. Needs for a financial budget

No matter which of the other methods of handling seasonal fluctuations in the requirements for cash may be employed, practically every business of considerable size has occasion to make use of loans from commercial banks. To have enough to carry a concern through a busy season is to have an excess at some other period of the year, and most concerns are not prepared to place it with outsiders so advantageously as a bank can place it, especially when we consider the small amount that must be placed at any one time; hence every business is more or less dependent upon the commercial banks. If the financial manager is to be sure of getting loans when he needs them, he must arrange for them in advance. This means that there are two points in the administration of any well-run business when some kind of an estimate, or budget—formal or otherwise—of the financial requirements for the next several months is an absolute essential. The first of these appears when a decision must be made as to the amount of credit to be sought for the next year or half year from the bank or banks with which the concern does business. There is, of course, no premium

upon absolute accuracy, since the concern may not draw upon the full line of credit which its bank extends; but too great and too frequent discrepancies would not do. The other point at which an estimate of financial requirements is needed reveals itself when a decision must be made as to the amount of trade obligations to be incurred: the concern must not undertake so much business that the need for cash will exceed the amount which may be secured through extension of bank credit and other expedients. The financial budget provides a censorship of business plans. In ordinary times this consideration may not be of great importance; but in times of financial stress it is of vital consequence, for upon it may depend the very existence of the business.

258. Need for standardized procedure

Modern business administration tends more and more to become a standardized routine. In a large organization such standardization is essential to the maintenance of a unified business policy and to the co-ordination of the activities of its several departments. Co-ordination implies subordination to a common head. Business men are gradually coming to realize that this can be accomplished best by the formulation of written plans formally submitted for approval. It is indeed questionable whether the best results can ever be permanently attained in any other way. It is not that plans will not otherwise be made but that, when not put into written form, they are quite commonly entrusted to one man's head. It is coming to be less and less possible to maintain a business organization that depends upon one man. The organization must be independent of any single individual in it. All of this means that there should be

some systematic method of gathering information from the past, of formulating plans for the future, and of recording results.

The standardization of the financial administration along the lines presently to be suggested, provides a further function for the financial budget, namely, the establishing, by the treasurer or other responsible officer of the concern, of certain safety-points so that those to whom he delegates the routine of the financial administration will know when matters need his personal attention. We will call these points the seasonal cash maximum and minimum and the peak-load credit reserve. They will be discussed in detail later.

259. Difficulties in way of financial budget

The financial budget is not a departmental budget in the same sense that the sales or purchases budget is. In a much greater degree it involves the whole of the business. This is not to say that there is any department in any line of business the plans of which do not require the hearty co-operation of the other departments. The very essence of a budget system is the co-ordination of the activities of the various department managers in such a way as to prevent their working at cross-purposes; but, in a peculiar degree, the financial budget involves the affairs of the business as a whole. It is one of the two general budgets. The other is the estimated balance sheet and the estimated statement of profit and loss. The transactions of each day's business must be planned with a view to their effect upon the profits and upon the cash balance. Neither of these effects can be completely determined from the activities of any one department. Every department has something to do with making

profits or it would not be in the business; and nearly every department, if not taking in cash, is at least continually requiring the expenditure of cash in its operations. There may be some question as to whether the term "financial budget" should be applied only to the plans in regard to cash: this term might equally well be used in connection with estimated profits. But neither set of plans can be made up except as summaries of the detailed departmental estimates. In any event the financial, or cash budget, is clearly the last of the budgets to be made up. For this reason, if for no other, it is likely to be the last to crystallize into a formal or standardized report. The development of the financial budget must wait upon the development of all the other department budgets.

Peculiar position of financial budget—The peculiar position of the financial budget can be seen more clearly if we recall the nature of the problem of meeting the season's cash requirements. There must be a fairly intimate co-operation between purchases and sales, or a business will purchase more than it can sell or sell more than it can deliver. There must be some slack; that is what the inventory is for. In the same way the cash balance serves the purpose of taking up or allowing slack as the cash needs of the moment require. It is the business of the treasurer or of some subordinate officer to receive cash as it comes in and to furnish cash as it is needed. If business conditions are fairly stable and the firm is not growing too rapidly, the treasurer can guess that the cash requirements will be about the same as last year. More than this he can hardly do without an intimate knowledge of the plans of all the other departments. An approximation to co-ordination

between the different departments can be obtained by assuming that things will be done in the future in those departments in about the same manner as they have been done. If it is suggested that, under changing business conditions or with a rapidly growing firm, estimates are difficult to make and untrustworthy when made, it must be replied that this is undoubtedly true, but that the alternative of no estimates is worse; for without some systematic attempt at co-ordination, unnecessary friction between departments and wastes of time and effort are certain to result.

260. Standardized business plans

There are many difficulties in the way of developing a standardized system of business plans. Partly because of and partly in spite of the fact that every business, no matter what it may be, must face the problems of financial administration, the methods of handling these problems are very unstandardized. The great range of sizes of businesses and sensitivity of cash requirements to change both in departments of the individual business and in business concerns generally, give to these problems a variety which very nearly baffles standardization. But without standardization there can be little or no delegation of authority to subordinates and, without such delegation, financial budgeting becomes little more than a species of mental arithmetic. So long as an able and experienced business man keeps watch over his own bank account, the question of how to make plans in a systematic manner and of how to preserve the past experience of the firm for future use, does not arise. It is the necessity of presenting plans in writing to a superior for his approval which leads to a standardized routine for

gathering information and for formulating plans independent of the life of any particular individual.

Even where standardization seems possible, many a business man is loath to let the vital function of financial administration pass out of his own immediate supervision. The old way has always worked, and the need for a change, as he sees it, is not so pressing as to warrant taking any chances on delegating this work to someone else. To do so might be to yield his claim to authority. If lack of standardization makes delegation impossible, unwillingness to delegate prevents standardization. In many cases, however, the business man is not so consciously unwilling to let this function go out of his hands as he is unable to do so. His judgments and decisions are the results of long experience, and he is quite unable to explain how he makes them. He can size up a situation with a high degree of accuracy, but he often cannot tell you how he did it. And where he is able to do so, competition operates to shroud this sphere of business activity in some privacy as a means of retaining any real or fancied advantage. So the inability and the unwillingness of those who handle the financial administration of different businesses to get together and to compare notes is a further hindrance to the development of a standardized routine. It so happens that in the case of those businesses where budgetary practice has been most completely developed—the public utilities, the fear of governmental interference and abuse of information for political ends makes the proprietors slow to give information regarding the methods they employ. This difficulty in getting information is necessarily a great handicap to the study of financial administration; but secrecy as a means to business success is on the wane.

261. Construction of the cash budget

In spite of the difficulty of getting reliable statistics on business practice, it is probably safe to say that most successful business men make up their estimates of the financial requirements for the coming year on the basis of the amounts required in previous years, taking into consideration such factors as the amount of business expected for the coming year, the general business conditions, and any plans that may be under way for extension of plant, etc. The method by which these factors are taken into consideration is, in the majority of cases, not improperly described as "expert guesswork." The length of time for which any such estimate is made will depend upon the conditions in the particular line of business in question, though six months and a year are probably typical periods.

Such a plan as this is about all that is possible where there has not been established a thorough-going departmental budget system. With such a system each department makes up a formal estimate of requirements and possible achievements and the general manager, in consultation with the departmental heads, organizes them into a single consistent plan for the season. Where such a budget system is already in existence, each departmental budget can be made to show among other things the estimated cash requirements and expected cash receipts.

Budget quotas and allotments—It is important to bear in mind that all budgets, from the point of view of executive control, consist of two parts. One part is an estimate of requirements for conducting the activities of the department, that is, an estimate of the probable requisitions for supplies, materials, labor, etc. This esti-

mate, being approved, is like an allotment in that it establishes a limit not to be exceeded without permission. The other part of the budget is a statement of the proposed accomplishments of the department—a tentative promise to deliver materials, services, etc., which promise, upon being accepted as a part of the general plans of the business, becomes a quota to be attained. That which from the point of view of one department is a quota from the point of view of another department is an allotment; and it is through this dovetailing of allotment and quota that a budget system co-ordinates the various activities of all the departments of a vast organization into a single unified policy.

Quotas and allotments in the financial budget—Applying this distinction to the financial budget, we find that each departmental estimate of cash requirements, when approved, comes to be an allotment of cash to that department. Once the allotment has been settled upon, the turning over of cash to that department becomes a mere matter of routine which can be delegated without serious loss of control on the part of the executive. This routine is broken and necessity for referring the matter to a superior official arises only in case the requirements prove greater than was anticipated. For convenience we will here designate the person in charge of the routine execution of the financial plans for the season as the cashier and the official in superior control as the treasurer. Of course some business usage will deviate considerably from this terminology.

On the other hand, we have the statement of expected cash receipts, or cash quota. Here, too, the receiving of or failure to receive cash is a matter of routine, so long as the quota is at least equalled. There

is no need for the treasurer to worry himself about the matter. But if receipts begin to fall behind expectations, it is up to the cashier immediately to report the matter. We see, then, that a budget system involves not only a method of gathering information necessary to the formulation of plans, but also a method of finding out how these plans are carried out after they have been made—a system of reports comparing plans and results for the use of the executive.

262. Purchases and sales

If each departmental budget is so organized as to show the departmental cash quota and cash allotment, it

| FINANCIAL BUDGET | | JOHN SMITH MFG. CO. | | | | | | JAN. 1, TO JUNE 30, 19__ | |
|--------------------------------|------|---------------------|-------|-------|-----|------|-------|-----------------------------|--|
| DISBURSEMENTS* | JAN. | FEB. | MARCH | APRIL | MAY | JUNE | TOTAL | | |
| PURCHASES | | | | | | | | | |
| PRODUCTION | | | | | | | | | |
| RECEIVING AND SHIPPING DEPT | | | | | | | | | |
| POWER AND PLANT DEPT | | | | | | | | | |
| SALES DEPT. | | | | | | | | | |
| ADMINISTRATION | | | | | | | | | |
| TOTAL | | | | | | | | | |
| RECEIPTS | | | | | | | | | |
| SALES AND COLLECTIONS | | | | | | | | | |
| PRODUCTION SCRAP | | | | | | | | | |
| POWER & PLANT | | | | | | | | | |
| MISCELLANEOUS | | | | | | | | | |
| | | | | | | | | | |
| TOTAL | | | | | | | | | |

is comparatively a simple matter to draw up the cash budget for the whole business. The accompanying illustration shows a form which might be used for a manufacturing company budgeting by months for the first six

months of the year. The upper part of the form is devoted to disbursements and the lower to receipts. Each monthly allotment for each department will be entered from the departmental budget into the line bearing the name of the department and the column for the appropriate month. The total estimated monthly disbursements will be shown in the last line of the disbursement section of the form and the departmental totals for the half year in the last column. The cash quotas will be similarly transferred from the departmental budgets to the appropriate lines and columns of the lower section of the form.

Effect on cash budget—Any extensive changes in plant and equipment involving payments of cash will affect the cash budget. In whatever way the cash may be raised, it is very improbable that it will be raised at just the time and in just the amounts that the extension of plant will require. Putting into effect plans for such changes will therefore affect the cash balance and the short-time commercial loans which must be reckoned with in any system of financial budgetary control. On the one hand, there will be estimates of the cash requirements for the construction work and of the periods within which the requirements must be met. These may be made out by company engineers, architects, or contractors according to the circumstances. The methods of making up these estimates need not concern us here. On the other hand, there will be estimates of the amount to be raised by the sale of securities and of the time which is most favorable for floating the issue. The student should by this time be quite familiar with a good many of the details involved in such an undertaking. The disbursements involved in the construction work and the

receipts from the issue of securities then become respectively a cash allotment and a cash quota. They enter into the financial budget in precisely the same way as do the payment of purchase accounts and receipts from sales.

Departmental cash quotas and allotments—But we have only passed the difficulty along to the several departments. How are we to find out how much cash is involved in the plans of each department? The estimates for pay-rolls, for such overhead expenses as taxes, insurance, interest, dividends, sinking-fund charges, rent, water, electricity, etc., and for expenditures in connection with the maintenance and extension of plant should not involve any insurmountable complications in calculating the time and amount of cash requirements. But in the case of the purchase or sale of goods or services on account, the question of time causes a good deal of difficulty. Purchases and sales estimates must first be divided to show the cash and credit transactions separately. Where there are wide differences of terms, it may be desirable to analyze also the transactions by departments, territories, or lines of goods. In any event the problem is to determine at what time the accounts involved will be collected or paid.

Analyzing collections—One possible method of analyzing collections is to keep a record of collections so as to show, for the sales of each month, the percentage of collections made during that and each ensuing month. The estimated receipts from sales could then be presented on the basis of the percentages established in this way in previous years. The following illustration shows a form in which this method could be worked out. It is assumed that the budget is made by months for the coming half year. The total of accounts receivable on the

| SALES & COLLECTIONS ESTIMATE | | | JOHN SMITH MFG. CO. | | | | | | | | | | | | JAN. 1, TO JUNE 30 19 .. | | | |
|------------------------------|-------|----------|---------------------|---------|-----------------|---------|------------------|---------|------------------|----------|----------------|----------|-----------------|----------|--------------------------|----------|----|--|
| 1 | TOTAL | BAD DEBT | JAN. COLLECT'NS | | FEB. COLLECT'NS | | MARCH COLLECT'NS | | APRIL COLLECT'NS | | MAY COLLECT'NS | | JUNE COLLECT'NS | | JULY, 1 RECEIVABLE | | | |
| 2 JAN 1 RECEIVABLE | 2 | 3 %/ | 4 | 5 %/ | 6 | 7 %/ | 8 | 9 %/ | 10 | 11 %/ | 12 | 13 %/ | 14 | 15 %/ | 16 | 17 %/ | 18 | |
| 3 JAN | | | | | | | | | | | | | | | | | | |
| 4 FEB. | | | | | | | | | | | | | | | | | | |
| 5 MARCH | | | | | | | | | | | | | | | | | | |
| 6 APRIL | | | | | | | | | | | | | | | | | | |
| 7 MAY | | | | | | | | | | | | | | | | | | |
| 8 JUNE | | | | | | | | | | | | | | | | | | |
| 9 TOTAL | | | | | | | | | | | | | | | | | | |

books on January 1 is entered on line 2 of column 2; the sales estimate for the month of January below it on line 3, etc., down to the sales estimate for the half year on line 9. Each of these items is then distributed among columns 4, 6, 8,18 on the basis of the percentages indicated in columns 3, 5, 7,17. These percentages would be made up on the basis of sales reports for previous years, presented in similar form. The column totals in line 9 will then give estimates for the collections for each month. The collection period varies considerably with business conditions; consequently the percentages are subject to fluctuations that are not easy to predict exactly.

A somewhat simpler method of handling the problem is to calculate the average turnover, or collection, period and to use this directly as a lag on sales. The average turnover period of accounts receivable in fractions of a year is the average of accounts receivable at the end of each month divided by the amount of collections for the year. In case this should prove to be one-twelfth of the sales estimate for, say the month of March,

this amount would be the collections estimate for April, etc. But if the turnover period were 20 days instead of an even month, the collections for May would be about equal to the sales from April 11 to May 11, a figure which cannot be obtained directly from the sales estimate. Partly on this account and partly because the collection period may vary from season to season and is sure to vary according to business conditions, the whole thing may be more easily handled graphically. (If the collection period is varying, the collections for one month will not correspond to the sales during an interval of equal length.) It is best to show the sales and collections in cumulative form; that is, to show the total sales from January 1 to each succeeding date. The diagram on the opposite page illustrates this in a graphical way. The dates are shown on the horizontal scale (Sundays and holidays should be omitted); the amounts are shown on the vertical scale. The diagram is based on the following data:

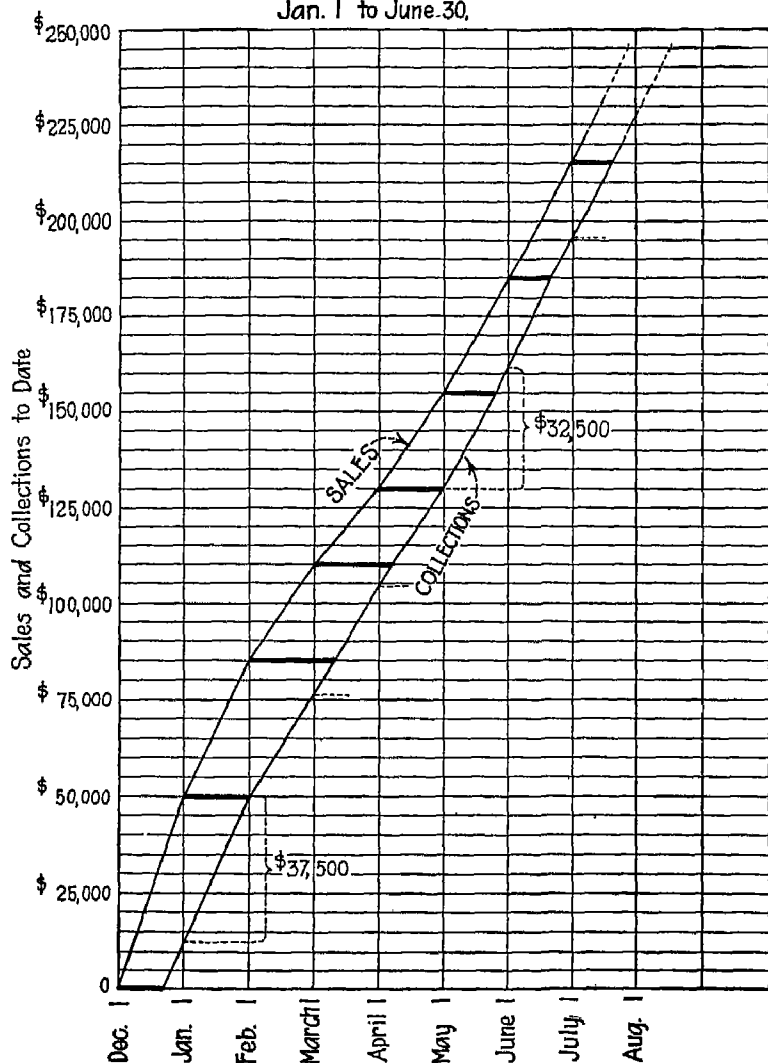
| Month | Sales Estimate | Est. Coll. Period |
|----------------|----------------|-------------------|
| December | \$50,000.00 | 20 days |
| January | 35,000.00 | 30 |
| February | 25,000.00 | 40 |
| March | 20,000.00 | 35 |
| April | 25,000.00 | 30 |
| May | 30,000.00 | 25 |
| June | 30,000.00 | 20 |
| Total | \$215,000.00 | |

The estimated collection period is determined by the experience of the same months of preceding years. On the graph the estimated collection period is measured from the first of each month, and, for a 30-day collection period, is drawn parallel to the base line to the next

JOHN SMITH MFG. CO.

Estimate of Accumulated Sales and Collections with
Variable Collection Period

Jan. 1 to June 30,



vertical ruled line; or more or less according to the time. The collections graph is obtained by connecting the right-hand ends of these horizontal lines. From it we can read off the collections estimate for any month, as January, \$37,500.00; and May, \$32,500.00, according to the vertical distance between the points, where the collections curve crosses the vertical rulings, as indicated by the dotted lines at the right. The estimates for the collection periods are based on measurements of the lag of collections behind sales on the graphic reports of the actual sales and collections of previous years. The estimates must, of course, be modified in view of business conditions. The governmental index number shortly to be established for collections may be of assistance in making these corrections.

263. Bank transactions omitted from budget

The financial budget, if it is to be more than a very rough estimate, must be a summary of all the departmental budgets. It must show the total estimated cash receipts for each cash-receiving department and the total estimated cash disbursements for each cash-disbursing department, with one exception. We have seen how these totals would be obtained in the most difficult case, the collection department. The case of payments for goods bought on account can be handled similarly, though it is simpler as these payments are more subject to control. The transactions which have been omitted from the budget are those which have to do with the elastic and controllable factor which maintains the balance between variable assets and variable liabilities-and-proprietorship, that is, receipts and disbursements from commercial loans. It is the amount of these transactions which the

budget is designed to ascertain. Hence we cannot expect to use it in our calculations. It was not shown on the budget as the answer to our problem, because we still have one or two other factors to take into consideration.

264. Revisions of budget

In most manufacturing and commercial businesses where budget systems are employed, it is necessary to revise the departmental budgets from time to time, perhaps every month. In certain public utilities where the overhead charges are large, this is probably not so necessary. In such a case allotments and quotas would stand at the original figure, subject to applications for further appropriations. But where the other departments make a monthly revision, there will necessarily have to be also a monthly revision of the cash budget. The departmental allotments and quotas will, in this case, vary from the figures fixed at the beginning of each month. Where any department purchases on open account, it will be more convenient to have the allotments expressed in the form of total purchases allowed for the month.

265. Summary

The problem of financial control with which we have been concerned in this chapter is that of ensuring that the firm shall always have on hand the funds necessary to carry on its operations and yet that it shall be able to dispose of these funds advantageously when they are not needed. While there are a number of other supplementary expedients, the almost universal practice is to depend upon the commercial banks as agents through which to secure or to place loans to meet the temporary needs of the business.

In order to be certain that funds will be forthcoming when needed, these funds must be arranged for in advance; and this means that there must be some systematic means of estimating what the arrangements will be and of finding out how this estimate is being lived up to. In other words, in order to co-ordinate the activities of the financial department with those of the other departments, there must be a departmental budget system.

Each departmental budget must be made to show its cash allotment and cash quota as an essential part of its plans for the season. By assembling these we can get an estimate of the season's cash requirements for the company as a whole.

In more recent times the tendency has developed to have larger amounts of cash on hand than it would be expected from the above statement. This is due to many factors. Lack of immediate re-investment possibilities and combined with the desire to build up reserves for maintaining even dividend payments in periods of depressed business, are among the outstanding reasons for larger liquid assets. The degree of such liquidity will determine the degree of dependence on commercial banks for the meeting of temporary cash needs.

Chapter XXVIII

Cash Budget as a Basis of Executive Control

266. Relation of cash budget to budgetary program

The budgets are made out on the basis of statistics for previous years and show the plans of the subordinates as approved by the executive. By securing formal reports from his subordinates, the executive may determine whether the plans are being followed. Many apparently successful businesses lack such a system in whole or in part, but sooner or later they are likely to pay for their negligence in a lack of departmental co-ordination. One of the principal values of a budget system is that it keeps the departments working together harmoniously.

The financial or cash budget is in a sense one of the two general business budgets—a cash receiving budget and a cash disbursements budget—made up on the basis of the separate departmental budgets. Each cash-receiving department includes in its budget an estimate of cash receipts for each month of the coming budget period, and each cash-disbursing department states its expected cash requirements. Of course, the length of time for which the budget should be made up and the relations of the various departments to the cash budget will differ considerably in the various lines of business. The figures and forms here presented are entirely arbitrary, but they will serve the purpose of illustrations.

In most lines of business, except in very large concerns, nearly every important department has need for some cash. The receiving of cash is more likely to be specialized, particularly in a manufacturing concern

where the principal receipts are likely to be from collections. But, in any case, the various departments concerned must present in their budgets estimates of cash receipts and disbursements. When these have been approved, the estimated receipts become a quota to be obtained and the disbursements an allotment, or appropriation.

267. Determining peak load

The cash budget, when it is assembled from the data given in the several departmental budgets, serves as a basis from which to estimate what we have called the financial peak load; this, in turn, becomes a basis from which to estimate how large a line of credit it will be necessary for the business to establish at its bank or banks in order to carry out its program for the coming season. Indeed the budgets of the business cannot be finally approved and, in fact, are not properly the program of the business until an adequate line of credit is established to carry the program through. The budget, then, is a basis for planning bank credit.

Tabular method—But in order to use the cash budget in this way, it is necessary to know the maximum amount of commercial loans that will be required during the period. This maximum is necessitated by the financial peak load,—the load which comes at the time when the variable assets of the business are largest. In order to determine what this maximum amount will be, it is necessary to break up the estimate of cash receipts and cash disbursements for the period into estimates for sub-periods. In the example used in the preceding chapter, page 410, receipts and disbursements were taken by months for a half year. This form provides an easy

means of ascertaining the maximum excess of disbursements over receipts from the beginning of the period up to the time of the peak, provided the peak load falls at the end of a month. But if the peak load falls at or near the middle of the month, this form cannot be used, since it gives no indication of when the peak occurs. By way of illustration, let us suppose that during the first four months of the period our budget shows disbursements \$161,000 and receipts \$106,000, while for the fifth month receipts are \$29,000 and disbursements \$34,000. On this basis, if the receipts are in excess in the last month of the period, the apparent peak load would be \$60,000 and would come at the end of the fifth month. But it may be that during the first half of the fifth month the disbursements would be quite large as compared to the receipts while during the second half the receipts would exceed the disbursements. If this is the case, the apparent peak, as shown by the budget table of monthly receipts and disbursements would be considerably below the actual peak. Assuming a fairly continuous variation in receipts and disbursements from week to week, a graphic presentation can be made which will show a closer approximation to the facts.

Graphic method—The graph, page 423, illustrates the graphic method of expressing the financial peak load. It is convenient to deal with the amounts accumulated from the beginning of the period up to each date. The dates are shown on the horizontal scale and the amounts on the vertical as before. After the points are plotted to indicate the receipts and disbursements up to the end of each month, these points are connected by two smoothed curves. The vertical distance between the two curves for any date will indicate the net excess of receipts

or disbursements, according to which curve is higher since the beginning of the period. Where this distance is the greatest for an excess of disbursements, here we have the time of the financial peak load. Using this method we find \$66,000 to be our estimated peak load, and May 15 as its approximate date.

Amount of bank credit required—The total amount of bank credit that will be required on May 15 will then be easily determined by adding together the four following quantities:

1. The total amount of bank loans outstanding on January 1
2. The financial peak load, or net excess disbursements from January 1 to May 16
3. The peak load credit reserve; or amount of bank credit to be held in reserve in case of emergency
4. The difference between the outgoing cash maximum and the amount of cash on hand on January 1

Until the last two items are discussed, it may be assumed that they serve as a basis for determining how much credit it will be necessary to have from the banks in order to carry out the plans for the season without financial embarrassment.

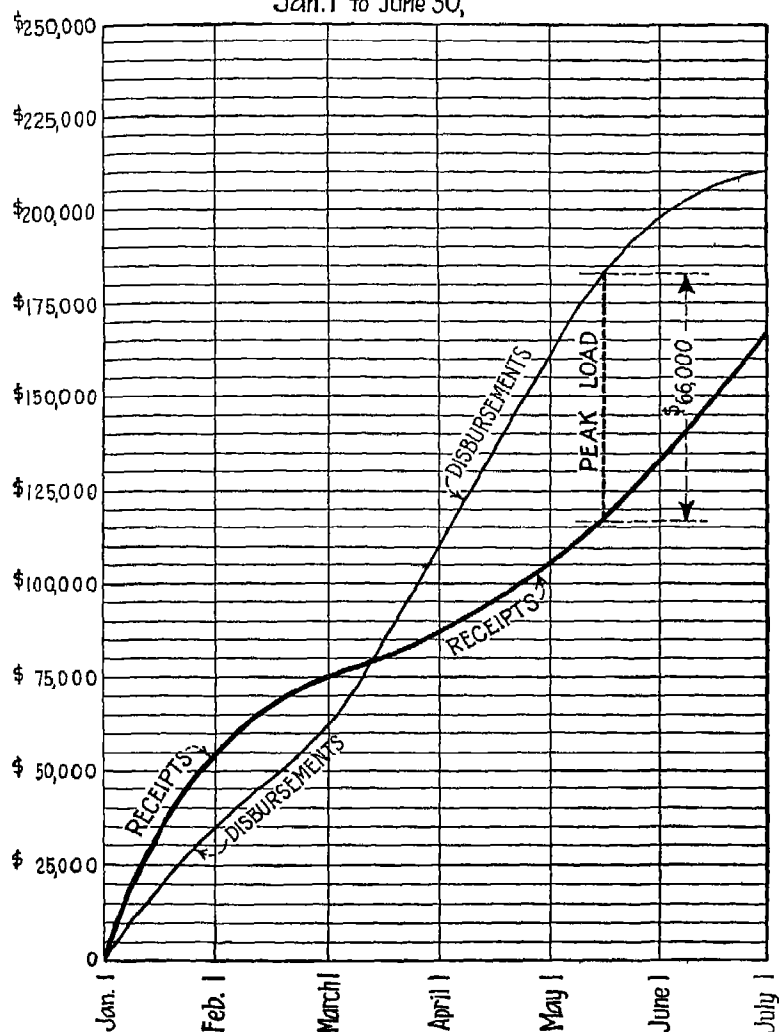
268. Revision of budget

The arranging of lines of credit at the different banks will of course be done by the treasurer or by another officer of the company entrusted with similar responsibility. In case he is unable to obtain adequate credit to cover the total peak load, that is, an amount equal to the sum of the four quantities just named, then all of the departmental budgets will have to be thor-

JOHN SMITH MFG. CO.

Estimate of Accumulated Cash Receipts and Disbursements
Showing Interpretation for Financial Peak Load

Jan. 1 to June 30,



oughly revised. In fact, a program of retrenchment must be immediately inaugurated. On the other hand, if the credit which the banks will allow the company is adequate, there will be no need to modify the cash requirements originally established. The relation of the cash requirements to the bank credit which the company can obtain explains how the cash budget exercises a censorship of business plans.

However, even after the cash budget has been approved, it is necessarily subject to some revision in the light of later developments. At the end of each month, therefore, the actual figures for the month should be compared with the original estimate; not only should the departmental quotas and allotments be checked but the totals for the whole business should be compared as a basis for revising the estimate, or budget, for the ensuing month. If these monthly revisions of the cash budget indicate a larger peak load for the business as a whole than had originally been anticipated, the treasurer may find it necessary to require a complete revision of the budgets for the entire balance of the period instead of for the following month only.

In many cases, however, the revision of the estimates for the following month would suffice, as only the quotas and allotments of the several departments would need to be seriously altered. The total cash requirements would not have to be reduced. To obtain the data necessary for making such a revision, the form shown on the opposite page might be used. In this case it is assumed that the original budget was made out for the first half of 19 , and that the revision takes place at the end of March. Columns 1 to 4 are copied or calculated from the original estimate.

JOHN SMITH MFG. CO. *March 31,*

MONTHLY REVISION OF FINANCIAL BUDGET

| | | ORIGINAL ESTIMATE | | | | ACTUAL | | | REVISED ESTIMATE | | | |
|-------------------------------------------------------|-----------------------------|-------------------|----------|----------|-------------------|-----------------|----------|--------|------------------|----------|----------|-------------------|
| | | JAN 1 to FEB 28 | MARCH | APRIL | JAN 1 to APRIL 30 | JAN 1 to FEB 28 | % OF EST | MARCH | % OF EST | APRIL | % OF EST | JAN 1 to APRIL 30 |
| DISBURSEMENTS | 1 PURCHASES | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | 2 PRODUCTION | | | | | | | | | | | |
| | 3 RECEIVING & SHIPPING DEPT | | | | | | | | | | | |
| | 4 POWER & PLANT DEPT | | | | | | | | | | | |
| | 5 SALES DEPT | | | | | | | | | | | |
| | 6 ADMINISTRATION | | | | | | | | | | | |
| | 7 TOTAL | 65,000 | 47,000 | 49,000 | 161,000 | 70,000 | +8 | 50,000 | +17 | 50,000 | +2 | 170,000 |
| RECEIPTS | 8 SALE & COLLECTIONS | | | | | | | | | | | |
| | 9 PRODUCTION SCRAP | | | | | | | | | | | |
| | 10 POWER & PLANT | | | | | | | | | | | |
| | 11 MISCELLANEOUS | | | | | | | | | | | |
| | 12 | | | | | | | | | | | |
| | 13 TOTAL | 75,000 | 15,000 | 16,000 | 106,000 | 75,000 | 0 | 18,000 | +20 | 24,000 | +20 | 117,000 |
| | 14 TOTAL NET RECEIPTS | 10,000 | | | | 5,000 | -50 | | | | | |
| NET CHANGE FROM ORIGINAL ESTIMATE OF CASH REQUIREMENT | 15 TOTAL NET DISBURSEMENTS | | 32,000 | 33,000 | 55,000 | | | 32,000 | 0 | 26,000 | 21 | 53,000 |
| | 16 | 5,000 | 0,000 | | | 5,000 | | 700 | | 7,000 | | 2,000 |
| | | Increase | Increase | Increase | Increase | Increase | | Change | | Decrease | | Decrease |

Column 1 shows the total of each item up to the first of the month just closed, that is, from January 1 to February 28. Columns 2 and 3 are taken directly from the original estimate, and column 4 gives the total of the preceding three columns. Columns 5 and 7 give the actual figures to compare with columns 1 and 2, respectively. Columns 6 and 8 are inserted to show the change from the estimated amount to the actual. Then on the basis of the departmental revisions for the coming month, the cash budget for April is revised in column 9. Column 11 indicates the total of the items in columns 5, 7, and 9, and the items in columns 9 and 11 are then compared with the original estimates by the aid of percentages in columns 10 and 12.

The purpose of the three last horizontal lines is to show whether the effect of the actual business transacted and of the estimated business for the month just started will increase or decrease the financial peak load. Lines 14 and 15 are included to show the differences between the items in lines 7 and 13, line 14, representing a receipt balance, and line 15 representing a disbursement balance. Finally, line 16 is employed to compare columns 5, 7, 9, and 11 with columns 1, 2, 3, 4, by showing the amount of the increase or decrease in cash requirements. For example, the actual net receipts for January 1 to February 28 are \$5,000 as compared with an estimate of \$10,000, causing an increase of \$5,000 in the cash requirements. The revised estimate up to April 30, however, shows \$53,000 net disbursements as compared with \$55,000 in the original budget, a decrease of \$2,000.

269. Budget period

Up to the present time it has been assumed that the budget period has already been determined. Part of the budgetary work, however, involves a consideration of the period for which the estimates and plans are to be made. Two things must be decided: (1) the length of the period; and (2) the time of beginning.

It is of course essential that the period should fit into the fiscal or into the calendar year and that it should be adjusted to whatever peculiarities of business practice the particular trade may require. It might seem at first sight that the amount of loans outstanding at the beginning of the period would be a factor, but in reality this makes very little difference. Probably the most important point is that the peak load should be sufficiently distant from the beginning of the period to make certain that there is

ample time to arrange to cover it by credit at the banks or, where this is not possible, to inaugurate a balanced retrenchment policy. The time required for such a policy is roughly the output period from the time of ordering the raw materials or merchandise to the time of collecting on sales. The length of time for which the budget will be made up will depend largely on the length of this period, and it is desirable that the budget period be longer than the output period.

A change of policy means a change in the activities of the several departments, and the several departments cannot all enter upon a policy of financial retrenchment at one time. The purchasing of raw materials will naturally fall off before the finishing room slows down. The sales and collections departments are less likely to be involved in a curtailment, but the need for having a budget period of a year or half year is likely to lead to a budget period somewhat longer than the output period.

270. Peak load credit reserve

It is perfectly obvious that however carefully the original estimates of the cash requirements for the season may be made up, there will inevitably be some discrepancy between these figures and those for the actual business transactions that subsequently take place. It is desirable, therefore, that the lines of credit established at the banks should be large enough to allow some leeway over and above the expected cash requirements for contingencies not foreseen in the budget proper. It is this margin that is called the peak load credit reserve. A statistician would describe this margin or leeway as an estimate of the net probable error of the estimated cash receipts and disbursements.

The amount of the peak load credit reserve is clearly subject to variation from season to season. After this reserve has been established, on the basis of the cash budget, it becomes a matter of routine to determine whether the actual transactions are encroaching upon this reserve. This function can readily be delegated without loss of control by the treasurer to the subordinate whom, for convenience, we have designated as the cashier. Except for unexpected times when the credit reserve is being encroached upon, and except for the usual monthly revisions of the budget, the treasurer is relieved of the work of comparing the estimated requirements with the actual cash condition of the business, this being attended to by the cashier.

It would be quite impossible to furnish any simple formula which the treasurer could use in fixing the amount of the peak load credit reserve. It is highly probable that most careful business men have such a formula when they make their plans entirely without any formal budgetary system. But unless there is some definite record of the amount of margin allowed from year to year and also of the comparison between this margin and the actual discrepancy between actual and estimated cash requirements, the experience gained each year is gained by the manager and not by the firm. After a budget system has got well under way, however, the amount of error in the estimate of previous peak loads can be taken into consideration in the determination of the peak load credit reserve.

The amount of business expected, as shown in the budget, is very significant. The outlook in the way of general business conditions is also important, since times of crisis always make business more precarious. Other

factors of paramount importance are the willingness of the treasurer to delegate authority and the ability and trustworthiness of the cashier. The important thing is to have the amount of each peak load credit reserve established and recorded as a basis for fixing future peak load credit reserves. No general rule can be set up that will be much more definite than this.

271. Cash maxima and minima

The amount of the peak load credit reserve will depend upon the way in which the cashier determines whether the actual results of the business transactions have infringed upon it. The method which is later outlined is again dependent upon the establishment of another critical point, the outgoing cash maxima. There are, in fact, four critical points which we have to consider together—two maxima for the cash to be kept on hand at any one time and two minima. The use of maxima and minima as a means of standardizing a process so as to make it possible to delegate it and still to retain executive control is a familiar one in connection with storerooms, where the storekeeper compares the amount of any material on hand with an established minimum. When it falls below this, he requisitions sufficient material to bring the amount up to the maximum. The discretion as to how much to order and when to order thus rests with the official who fixes the maximum and the minimum.

A similar plan is not infrequently followed by firms who have to maintain a number of branch cash accounts. The maximum and the minimum cash balance for each branch is fixed by the central office, and the branch must keep its balance between these two limits. The handling

of cash, however, is a little more complicated than is that of materials and supplies, because it comes and goes, whereas materials move in only one direction. The store-keeper has only to requisition more goods, when the balance of stores falls below a set minimum. The cashier must not only get more cash when the balance is too low, but he must also dispose of the unnecessary surplus cash when the balance gets too high. For this reason it may in many cases prove desirable to have two pairs of limits, one for a cash-receiving period and one for a cash-disbursing period. Whether or not there should be seasonal maxima and minima of this sort would, of course, be a question for the treasurer or some other officer to decide. In some cases, a single maximum and minimum might often suffice; but in other cases the critical points for a cash-disbursing period would quite naturally be higher than for a cash-receiving period.

Procedure during cash-receiving period—During a receiving period the cash minimum would have to cover:

1. Funds used for making change, petty cash, etc.
2. Currency received but not deposited
3. The bank balance, including any amount or percentage of loans required to be kept on deposit and an excess to handle daily fluctuations

As the requirement that average deposits must be kept up to a certain percentage of loans outstanding is a very prevalent one, it would frequently be impossible to make the minimum a single fixed sum. Instead it would perhaps be desirable to separate the cash balance into:

1. The amount to be kept on deposit, a certain percentage of loans
2. The available balance. Only the available balance would relate to the cash maximum and minimum

Another possibility would be to establish a certain percentage of loans outstanding or a percentage plus a constant sum as the cash minimum. Even during a cash-receiving period there would very likely be single days when there would be a net excess of cash disbursements, and the cash minimum would have to be large enough to cover such daily fluctuations. Except in such cases as branch cash, where a deposit account might be kept with a bank which did not lend to the concern, the percentage loan requirement would probably serve to cover these fluctuations, since it is usually only the average deposits that must be maintained. In any event the minimum fixed for a cash-receiving period is designed to be the smallest amount that will safely hold the business until the balance is replenished by further cash receipts in excess of disbursements. The cash maximum is then set at some amount above the minimum by an amount equal to that of the loans to be paid off at any one time. It is the essence of the plan not to carry more loans at any one time than are really needed.

In case a business carries accounts with several banks, it will probably arrange to pay off all the loans at one bank at a certain time so as to clear up its account there temporarily, financing itself meanwhile by loans from other banks. In such a case the treasurer would specify to the cashier the period during the cash-receiving season in which each account would be cleared. Such a policy would, of course, depend on the relations of the treasurer with the several banks. But the general notion of a minimum cash balance to which the cash on hand is to be reduced by paying off loans when the cash has reached the upper limit, or incoming-cash maximum, is of fairly general application. Once these two limits have

been set, the carrying out of the policy becomes a matter of standardized routine.

Procedure during cash-disbursements period—The establishing of the outgoing cash minimum and maximum involves somewhat similar considerations in connection with the reverse process. In this case the cashier will wait until the cash balance reaches the established minimum. Then he will draw on the company's credit at one of its banks to raise the balance to the maximum. Here, too, the treasurer may prescribe the order in which the several lines of credit are to be drawn upon. By fixing the maximum and the minimum, he determines when a loan is necessary and how much is needed. The carrying out of this policy is a matter of detail about which he need not directly concern himself. The maximum must be sufficient to carry the concern for as long a period as he sees fit without necessitating another loan. If it is the company's policy to rotate, successive loans may not be obtained from the same bank. Neither does such a plan as this necessarily involve a shortening of the period of each loan; the same result can be obtained by allowing the various loans to overlap for different intervals.

The minimum for a disbursing period may be almost any amount, even zero, where a bank has sufficient confidence in a business to permit overdrafts. Here, as before, however, measures must be taken to meet the bank's requirements in regard to the ratio of loans to deposits. The details of the plan will depend on the treasurer's relations with his banks.

Office cash requirements—In considering the funds used for making change and the currency received but not deposited, the problem of determining the amount

required is very much like other problems of determining inventory. Other things being equal, it is desirable that the turnover should be as rapid as possible. However, it is probable that the required amount would not be subject to great variations, and that the turnover in the past could be used as a basis for estimating the requirements for the future even in an expanding business. In the case of money for deposit, it would be clearly quite stable and would be roughly at the rate of 1, 2, 3, etc., times a day according to the number of times each day deposits were made.

Hence one could assume that this sum would increase in proportion to estimated receipts. Thus if the receipts for January were \$30,000 and the average currency on hand for deposit \$500, then, if the estimated receipts for February were \$45,000, the average currency for deposit would be \$750.

The case of change money, petty cash, etc., can be handled in a like manner, although the rate of turnover in this case might be somewhat more difficult to obtain. It might be estimated by taking samples; but, in any case, the general principle would be similar to that used in obtaining turnover for money for deposit.

Each case stands by itself—In the case of the seasonal cash maxima and minima, as in the case of the peak load credit reserve, no general rule can be set up which would enable one to determine these critical points under all conditions. General business conditions, the type of business organization, the plans for the season, must all be taken into consideration. The fixing of these limits is a matter of executive discretion. After they have been determined, the execution of the plan is a matter of routine.

272. Daily tickler system

In the case of allotments to the purchasing departments, the allotments will probably be made in terms of goods to be purchased rather than in terms of cash. But it would be necessary for the cashier to keep a careful check on the purchasing departments to see that they did not exceed their allotments. Indeed, the effect on the cash balance is so intimate that it would probably be necessary to break up the monthly allotment into shorter periods. Each invoice of goods received will, as soon as possible, be sent to the cashier so that he will know when and how much he is going to have to pay. In case it should seem desirable to break up the monthly purchase allotment into 10-day periods, one method of accomplishing this would be as follows: The treasurer might fix percentages of the allotment not to be exceeded without his consent for the first 10 days and for the first 20 days. Thus the total for the first 10 days might be passed by the cashier if it did not exceed 40 per cent of the total allotment for the month, and for the first 20 days if it did not exceed 70 per cent. If the purchases should exceed these percentages, or 100 per cent at the end of the month, the cashier would have to notify the treasurer. In this way the treasurer would look into the amounts of purchases only in those exceptional cases which he deemed worthy of his attention. In these cases the matter would doubtless be taken up with the department head in question to find out whether the special circumstances warranted such a procedure.

Daily cash program—In order that the cashier may keep track of the time and amounts of cash required, a daily tickler system may be established. He will, of course, have notice of each invoice to be paid several

would have to go to the treasurer for approval. Otherwise it would be entered on the daily cash program card and then filed under the date for which the cash was requisitioned. Upon approval by the treasurer, the item would of course be entered and filed in the same way as if no excess requisition were involved. The reader should bear in mind that there is no intimation in such a plan, as is here outlined, that the quotas and allotments should be inflexible. They are only statements of policies formulated by an executive for the guidance of his subordinate. To the subordinate alone they are inflexible. They may always be changed by the executive, if, in his judgment, it seems wise that they should be changed.

Providing for irregular cash requirements—In any business there will be inevitably a considerable amount of disbursements which cannot readily be assigned to any particular day, or the amount of which cannot accurately be anticipated. But the total of all these items for a longer interval, such as a month, may nevertheless be estimated with some assurance. Indeed the monthly disbursement allotments in the cash budget might be classified into: (1) Invoice and requisition items; and (2) Miscellaneous items.

It is always desirable to have some estimate of the net amount of receipts or disbursements for each day. An approximation to this amount may be obtained by dividing the miscellaneous total by the number of days in the month. While requisitions for irregular items cannot be sent in very far in advance, the amounts for each department can be checked against the allotments by the percentage plan already discussed. Precisely the same procedure applies except that it will not be followed so far in advance.

It is probably much less possible to make an accurate estimate of daily receipts in some lines of business than in others. In any case, the principal items are cash sales, if any, and collections. The cashier should keep very closely in touch with collections. In any event, he will have need to keep check on receipts and to report to the treasurer immediately any failure to reach the assigned quota. It will often be desirable here also to break up the monthly quotas into shorter periods by a percentage plan similar to that for allotments. The prime difference in the two cases is that, for quotas, the item to be reported will be a failure to make, say, at least 25 per cent of the total for the month in the first ten days, rather than a drawing of more than 40 per cent of the total as in the case of the allotment.

Estimating cash receipts from sales—In some lines of business it would probably be possible to treat sales invoices in a manner analogous to that of purchase invoices. If, for example, a fairly constant percentage of invoices were paid up at the end of a ten-day discount period, that percentage could be entered under the appropriate day in the cash program. But in many cases it is probable that the most satisfactory plan would be simply to enter in the cash program the average daily estimated receipts for the current month, that is, the total receipts for the month divided by the number of business days in the month.

Unused balances—One type of receipts deserves special mention here because it is created by the system. These receipts are the unused balances of requisitions. At first it would probably be difficult to estimate the amount of this type of item, although it would be a comparatively small one. As the system got well under way,

it would probably become smaller and less subject to fluctuation.

Revising the budget—In case the cash receipts should show any considerable divergence from the quotas for the month during the first part of the month, it might prove desirable to make some sort of revision of the budget for the balance of the month as a basis for entries in the daily cash program. This would of course be a matter for the treasurer to decide. If the receipts were too small, the percentage plan would bring the matter to his attention. The treasurer could also require the cashier to notify him in case the receipts should prove to be very much larger than had been anticipated.

Miscellaneous cash disbursements may show decided variations from the allotments just as miscellaneous cash receipts may show variations from quotas, and may operate in like manner to make revisions desirable. The treasurer could limit the amount of variation to be reported to him.

Cash-receiving and cash-disbursing periods—In order to determine whether the period is to be characterized as a cash-receiving period or a cash-disbursing period, and to estimate the cash requirements and the change in credit reserve during the next ten days, the results of the individual daily cash programs can be summarized in a budget such as that suggested in the following illustration. Only the net receipts or net disbursements for each day will be entered. If the receipts total is the larger, the period will be termed a cash-receiving period, and if the disbursements total is the larger, it will be termed a cash-disbursing period. The initial cash balance is added to the receipts total, and the incoming cash minimum or outgoing cash maximum, as the case may be, is added to

the disbursements total. During a receiving period the right-hand total is then subtracted from the left-hand total to show the loans to be paid. During a disbursing period the left-hand total is subtracted from the right-hand total to show loans required. Subtracting this from the balance of undrawn credit at the beginning of the

| JOHN SMITH MFG. CO. | | | |
|----------------------------------------------|-----------------|------------------------|-------------------|
| TEN DAY CASH BUDGET <i>April 26 to May 5</i> | | | |
| DATE | NET RECEIPTS | DATE | NET DISBURSEMENTS |
| <i>April 26</i> | <i>3,500.00</i> | <i>April 27</i> | <i>500.00</i> |
| | | <i>28</i> | <i>6,500.00</i> |
| | | <i>29</i> | <i>4,750.00</i> |
| | | <i>30</i> | <i>5,750.00</i> |
| | | <i>May 1</i> | <i>1,000.00</i> |
| | | <i>2</i> | <i>8,500.00</i> |
| <i>May 4</i> | <i>800.00</i> | <i>May 5</i> | <i>3,500.00</i> |
| Total | <i>1,150.00</i> | Total | <i>4,400.00</i> |
| Initial Cash Balance | <i>5,350.00</i> | Out-Going Cash Maximum | <i>10,000.00</i> |
| Total | <i>6,500.00</i> | Total | <i>14,400.00</i> |
| Less | | Less | <i>6,500.00</i> |
| Loan to be Paid | | Loans Required | <i>7,900.00</i> |
| Credit Reserve | <i>April 26</i> | <i>18,000.00</i> | |
| Estimated Credit Reserve | <i>May 5</i> | <i>10,100.00</i> | |
| Peak Load Credit Reserve | | <i>5,000.00</i> | |

period will show what the credit balance will be at the end of ten days as compared with the peak load credit reserve. Should it ever prove smaller than the peak load credit reserve, the treasurer should be notified at once. This estimate could be made out daily if desired, and very likely it would be desirable to have it made out daily when the financial peak or foot was near. During

the rest of the budget period three times a month would probably suffice.

On the basis of the ten-day cash budget, which characterizes the period as a receiving or disbursing period, the cashier would make out a daily cash and credit statement. It would probably be desirable to have two forms for this statement, one to be used during a receiving period, the other to be used during a disbursing period. In order to distinguish between them, these two similar forms might be printed on paper of different colors. An example of a form which might be used for the cash disbursing period follows. The form for the

| JOHN SMITH MFG. CO. | | | | | |
|---------------------------------|---|--------|-----------------------------------------------|----|--------|
| DAILY CASH AND CREDIT STATEMENT | | | | | |
| (For outgoing cash period) | | | April 26 - | | |
| Continental & Commercial | | | Maximum Cash Balance | 10 | 000 00 |
| Corn Exchange | | | Actual Cash Balance | 6 | 000 00 |
| First National | | | Loans Required | 4 | 000 00 |
| For Deposit Checks | | | Loans Outstanding Continental & Commercial | 12 | 000 00 |
| Currency | 4 | 800 00 | Corn Exchange | 10 | 000 00 |
| Gold | | | First National | 16 | 000 00 |
| Silver | | 298 00 | | | |
| Till Money | | 52 00 | Total | 42 | 000 00 |
| Petty Cash | | 200 00 | Total Credit Allowed | 60 | 000 00 |
| Total | 5 | 350 00 | Balance of Credit in Reserve | 18 | 000 00 |
| Minimum Cash Balance | 5 | 000 00 | | | |

cash-receiving period would be very similar—minimum and maximum cash balances would change places and loans to be paid off would be substituted for loans required. The total of the left-hand column will give the amount of cash on hand. Subtracting this from the out-

going cash maximum will give the amount of loans required that day. (If the cash balance is above the minimum, no loans are required.) Conversely, during a receiving period, if the cash balance is above the maximum, subtracting the minimum from it will show the amount of loans that the cashier is to pay off that day. The loans outstanding at the start plus the increase or minus the decrease can then be subtracted from the total credit allowance to show the balance of credit still in reserve. In this way the times for borrowing and for paying off loans are fixed by the treasurer. The cashier has only to carry out the policy which has been established for him.

273. Summary

This brings us to the end of our outline of the methods of administration having to do primarily with the furnishing of cash as it is needed in handling the seasonal financial problems of a business through such expedients as loans from commercial banks. The problem was to reduce this phase of financial administration to a matter of record and routine which would preserve the business experience to the business rather than to its executive, and which would make possible a more economical use of the time of the executive by delegating the routine, while he still retains control. It was not intended to claim any particular merit for the details of financial administration suggested here by way of example. The details will necessarily vary widely from one type of organization and line of business to another. But for any business it should be clear that it is better to plan and to arrange in advance for the loans that will probably be needed than it is to trust to luck that funds

will be forthcoming when needed. In order to co-ordinate the activities of financial administration with those of other departments of the business, some systematic method of formulating departmental plans and organizing them into a single consistent policy for the whole business is essential. This means that records must be kept in such a way that they may be useful for making up the plans for the next period. Once the plans have been approved in the form of quotas and allotments, they become orders for the subordinates to carry out, and to be questioned only by the superior in case revision seems necessary. In order that the plans may be carried out, the subordinate makes reports in which the actual conditions are compared with the estimated conditions.

Other benefits incidental to this method of handling financial problems are: the executive's time economized; business experience preserved in record form; the activities of the various departments co-ordinated and harmonized; and a business, which is administered in this manner, necessarily on a firmer financial foundation than it could be under a less systematic procedure. Through the use of a financial budget, the banker can "see his money coming back" in a much more real sense than when he thinks merely in terms of current assets and current liabilities.

The cash budget is made out from data supplied by the various cash receiving and cash disbursing departments. On the basis of this budget the treasurer or other responsible officer arranges with his banks such lines of credit as may be needed to meet the seasonal requirements. The treasurer fixes certain critical points as guides to the cashier and beyond that for the season, and takes a hand in the administration only under excep-

tional circumstances. By fixing the incoming and outgoing cash maxima and minima he determines when and how much to borrow from or to pay to the banks. The cashier can then proceed without further instructions. So long as departments are up to their quotas the cashier has no need for additional funds; so long as they keep within their allotments he has no need of authority for paying out more cash. By fixing the peak load credit reserve as a margin of credit not to be drawn upon, the treasurer determines the circumstances which may require his personal attention to matters of a financial nature. Thus the treasurer may exercise control over his subordinate without concerning himself with particular transactions of routine. The budget and the reports of the subordinate constitute the basis for executive control.

VII. Credit Control

Chapter XXIX

Procedure for Establishing Credit Limitations

274. Importance of credit in modern business

"The great importance of the institution which we loosely call 'credit' finds emphasis in such common expressions as: 'Modern industrial society is a credit society'; 'credit is the heart and core of the industrial system'; and 'credit is the life blood of commerce and industry.' "*"

In modern business practice a large percentage of the merchandise sales and purchases are credit transactions. The purchaser receives the merchandise with the agreement to make payment at a future date. As a result of this policy, the balance sheets of most mercantile and industrial firms show accounts receivable due from customers as one of the most important of the current assets. It usually contests with merchandise inventory for the supremacy of the current assets. In addition, on many balance sheets notes receivable, which represent but another form of claims against customers, is an item of considerable importance. The accounts receivable and notes receivable are regarded of prime importance, because it is largely from the liquidation of these that the business expects to obtain the funds with which to meet its current liabilities. It is important, therefore, that customers pay their accounts and notes, and that they pay them promptly according to the terms of agreement.

*H. G. Moulton, "Financial Organization of Society "

275. Relation of credit to financial management

It is apparent that a considerable part of the capital with which a business carries on its operations is obtained through the liabilities contracted by the business. In other words, it is obtained by means of the credit granted to the business by merchandise creditors, banks, note-holders, and bondholders. We have seen that the problem of maintaining the necessary supply of cash is primarily a problem of determining the amount needed and of securing the necessary credit from the banks.

Not only is the amount of capital obtained dependent on the amount of credit secured, but, what is of equal importance, the amount of capital required is also dependent to a considerable degree upon the amount of credit granted. If extensive credit is granted to customers, the capital needs of the business will be increased. If the credit granted to customers is restricted, the capital requirements of the business will decrease. It should be quite evident, therefore, that the control of credit received and credit granted is very closely connected with financial management and control.

276. Requirements for credit control

To insure the fulfilment of the customer's contract and the consequent fulfilment of the contracts of the business with its creditors two things are necessary:

1. The exercise of care to grant credit to those only whose past conduct and present financial condition prove a willingness and an ability to pay their obligations
2. The exercise of vigilance to enforce payment in those cases where the customer fails to meet the terms of his contract

277. Functions of the credit department

The granting of credit and the enforcement of collections are usually considered of sufficient importance to make expedient the organization of a credit department under the control of a functional staff executive who shall be responsible for its operations. The functions which are usually delegated to the credit department are the following:

1. Collection of data with reference to business and trade conditions in general, and with reference to particular trades and lines of business
2. Collection of information with reference to prospective customers who apply for credit, and passing on their requests
3. Collection of data with reference to customers whose original request for credit has been granted and the maintenance of a continuous record of the relations of the business with these customers
4. Maintenance of a record of all accounts past due
5. Enforcement of the collection of all accounts past due

All requests for credit are not necessarily desirable. Companies and individuals may desire to purchase goods on account when they are not in a sound financial condition. If credit is extended to them, the seller will suffer by having to wait beyond the agreed date for settlement or by receiving no payment at all. It is the function of the credit department to determine which accounts are desirable and which are deemed unprofitable. To do this it must not only have information with reference to the financial condition of the particular applicant, but must also know the general market conditions in order that it may judge the applicant's status in terms of these conditions and judge the future of the applicant in the light

of the market tendencies. After the applicant's original request has been granted, there is no assurance that he will continue to be a desirable credit risk. It is necessary, therefore, that the credit department maintain an available record of information showing the relations of the business with its customers. Finally, no matter how careful the credit department may be, there will be some customers who will not fulfill the terms of their agreement. This necessitates that the credit department take steps to secure the collection of all accounts past due.

278. Organization of the credit department

The organization of the credit department in any particular business depends on the size of the business, the nature of its operations, and the organization of the business as a whole. In any case, the proper performance of its tasks requires the use of trained men under the supervision of a responsible executive. In some businesses the credit department is subordinate to the office of treasurer, since, from one point of view, the work of the credit department is financial in nature. In other businesses, particularly retail stores, the credit department is separate from the other executive departments to the extent that its executive head exercises the same powers of administration as do the other executives.

In some cases there is a collection manager who is responsible for the enforcement of collections. In this case the credit department is restricted to the granting of credit only. The principal requirement is that the department be organized so that it can work in efficient co-operation with the sales, finance, and accounting departments. It must co-operate with the sales department in securing as great a volume of sales as possible, consistent with

the reduction of losses on bad debts to a minimum. It must co-operate with the financial department in estimating the funds required to finance the credit to be granted and the probable receipts from the credits granted. After this estimate has been formulated into a financial program, it must render all assistance possible in its execution. It must co-operate with the accounting department because it is from this department that the credit department obtains a considerable part of the information on which the operations of the credit department are based.

279. Sources of credit information

It is the function of the credit department to pass, either directly or indirectly, upon each sales order for the purchase of merchandise on account. Its method of doing this depends somewhat on whether the request is from one who has not had former relations with the house.

When an original request for credit is received, the credit department will have no information on file and must begin an original investigation with reference to the applicant. The sources of information with reference to a prospective customer are numerous but the following are those of most importance:

1. The customer
2. The salesman
3. Mercantile agencies
4. Credit associations
5. Banks
6. Business houses
7. Commercial paper brokers
8. Collection agencies
9. Lawyers
10. The National Association of Credit Men
11. Trade papers and financial manuals

280. The customer

Many firms have standard forms which they furnish to applicants for credit on which they may submit the necessary information. These forms usually call for a balance sheet, a condensed statement of profit and loss, and answers to various questions with reference to the nature of the firm's proprietorship, contingent liabilities, outstanding orders, etc. A typical form for such a statement is shown on page 450.

Formerly little attention was given to the statement of profit and loss; the present tendency is to attach very great importance to it. The applicant for credit is in a better position to give information with reference to himself than is anyone else. There is always the danger, however, that the information which he furnishes may be inaccurate. Such inaccuracies may be intentional or they may be due to ignorance. The modern tendency to require a balance sheet and statement of profit and loss which have been verified and attested by a certified public accountant does much to insure the reliability of the information presented by the applicant.

In addition to the information gained from the written statements submitted by the customer, much valuable information can be obtained from personal interviews where these are possible. In some cases a customer desiring credit visits the credit man to make arrangements therefor. This gives the credit man an excellent opportunity to judge the ability of the applicant. It is not difficult to judge from the conversation of the latter whether he has a proper knowledge of his business. If the customer shows a tendency to buy extravagantly and to select poor lines of goods the credit man has evidence that he is apt to purchase unsalable goods which in the

PROPERTY STATEMENT

To SMITH-TAYLOR CO., INC., Richmond, Va.,

For the purpose of obtaining credit or extension of time on notes or open account from you we make the following true statement of our Assets and Liabilities, and agree to immediately notify you of any material change in our financial condition.

FIRM OR CORPORATION NAME

TOWN STATE
Names of members comprising firm, or, if corporation, names of officers.

| BUSINESS ASSETS | Dollars | Cents | BUSINESS LIABILITIES | Dollars | Cents |
|-------------------------------------------------------------|---------|-------|---------------------------------------|---------|-------|
| Cost Value of Merchandise on hand | | | Owe for Merchandise, not due | | |
| Store Furniture and Fixtures | | | Owe for Merchandise, past due | | |
| Cash on hand and in Bank | | | Owe notes for Merchandise | | |
| Amount of open book accounts, good | | | BORROWED MONEY | | |
| Notes good and collectable | | | (Not including Real Estate Mortgages) | | |
| Cash value of other personal property described as follows: | | | Owe Bank | | |
| | | | How secured | | |
| | | | Owe friends or relatives | | |
| | | | How secured | | |
| TOTAL ASSETS | | | TOTAL LIABILITIES | | |
| (Not including Real Estate) | | | | | |

RECORD OF ALL REAL ESTATE OWNED

| TITLE IN NAME OF | SEC. LIST | TOWN OR BLOCK | RANGE | CITY OR COUNTY | STATE | VALUE | USED AS HIGHWAY | AMOUNT OF ENCUMBRANCE |
|------------------|-----------|---------------|-------|----------------|-------|-------|-----------------|-----------------------|
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INSURANCE {On Merchandise.....} Is it assigned to any one?.....
{On Store Building.....}

Any chattel mortgages?.....To whom?.....What on?.....

Are any merchandise creditors secured?.....Who?.....By what?.....

When did you commence present business?.....Formerly engaged in?.....Ever failed?.....

Date of inventory.....Amount \$.....

Amount of sales last year \$.....Expenses \$.....

Name of your bank.....

Are there any claims in attorney's hands against you?.....

Have you any indebtedness to friends or relatives not stated above?.....

Please answer all questions. Where no figures are to be inserted, write word None.

The above statement, both printed and written, has been carefully read by the undersigned, and is a full and correct statement of my or our financial condition.

Firm.....

Date.....By whom signed.....(OVER)

Where lack of space prevents explanation, use opposite side

Be Sure and Give a Complete List of Houses You Deal With and Amount Owed Each One on Reverse Side of this Sheet.

Approved and Adopted by the National Association of Credit Men.

| BUY GOODS FROM THE FOLLOWING FIRMS: | ADDRESS | AMOUNT OWING | |
|-------------------------------------|---------|--------------|-------|
| | | OPEN ACCT | NOTES |
| | | | |
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REMARKS:

end will lead him into financial difficulties. In some cases the credit man may be able to give helpful advice, while in others he may judge it wise to refuse the account entirely. If the credit man can visit the place of business of the customer he can obtain much useful information. He has an opportunity to see the customer's stock, the nature of his trade, his methods of operation, in short, almost everything which is needed to judge his ability and capacity. Many credit men find it worth while to spend a considerable time each year visiting the places of business of their customers. Of course, judgment must be used in selecting those customers to be visited.

281. The salesman

Many firms require the salesman, when he obtains an original order, to send with it his opinion of the financial condition of the purchaser and to support this opinion with such information as he is able to secure. Next to a visit by the credit manager, a visit of the salesman is the best source of information to the vendor. The salesman has an opportunity to obtain first-class information with reference to the customer. He may see the nature of the stock which the customer carries, the volume of his business, the character of his customers, and the operating methods which he employs. In addition, he has opportunities for intercourse with other salesmen who probably have previously sold to the applicant and from them he may be able to obtain much useful information. Although the salesman is in a position to obtain much valuable information, he is limited in his investigation. An alert salesman is able to learn whether the various companies he solicits are progressive and whether their respective markets are encouraging for trade possibilities.

It is not likely that he will know the exact figures of the financial condition of his buyers and there is a tendency for the salesman to be over-optimistic, since he naturally desires to increase his sales as much as possible.

282. Mercantile agencies

There exist certain mercantile agencies, the best known of which is Dun & Bradstreet, Incorporated of New York City, whose purpose it is to collect information relating to the financial condition of business firms. Each agency maintains a staff of reporters who, by personal visits and investigations, collect information with reference to business firms. The reporter gathers his information in various ways. First, he obtains a financial statement from the customer and, if possible, a statement of earnings over a series of years. He also obtains from the merchant as extensive information with reference to his financial condition and business prospects as possible. In addition to the information provided by the merchant, the reporter seeks to obtain additional data by inquiries at local banks and business firms. He also makes his own observations with reference to the general condition of the business of the merchant and combines the data obtained from all of these sources in a report to the officers of the mercantile agency. The officers by a study of these data seek to determine two things: (1) the net worth of the business, and (2) its credit rating. The agencies publish rating books which show the estimated capital and credit rating of each merchant with reference to whom they have been able to obtain sufficient data upon which to base a judgment as to reliability. In case they have not been able to obtain such data, they publish the name of the merchant without indicating the

foregoing facts concerning him. These rating books are lent to business firms for a yearly fee. In addition to providing these books, the agencies prepare for the use of their customers special reports with reference to all business firms listed in their rating book. These reports show the data on which the agency based its rating and they also include information which the agency has received since the preparation of the book. The agencies agree to provide each client with a certain number of these reports free of charge. If more reports are requested a small fee is charged for each one.

In addition to the foregoing services, the agencies send to their customers from time to time any essential data which they have obtained with reference to any of the firms listed in their rating book. For instance, they may report bankruptcies, fires, and similar events which will have an effect on the credit rating of the listed firms. The agency reports are very valuable, but it is unwise to place too great dependence upon them. The representatives of the agencies may be misled and may have obtained incorrect information, since they must depend to a considerable degree on the information supplied by the business itself. The ratings given in the reports of the two principal agencies should be compared to see whether they agree. If there is disagreement, this disagreement serves as a warning. In any case the agency rating should be verified by information gained from other sources.

283. Credit associations

In many cities there have been organized credit men's associations which collect data with reference to merchants and keep such data available for the informa-

tion of their members. The members supply to their associations information with reference to customers, and in this way much valuable data can be collected. In some cases the local organization affiliates with the national organization and by this means service may be rendered on a larger scale. There are also organizations in particular lines of trade which collect and distribute credit information.

The most systematic method of collecting and distributing credit information is that employed by the Credit Clearing House. All the members of this organization supply the central headquarters with statements concerning their customers. From these lists a card catalogue is prepared, a separate card being made for each customer reported. On this card is written the name of each member with which the firm has dealings. For instance, four members may report John Brown as a customer. In this case the card prepared for John Brown would contain the names of each of these four members. If a fifth member requests information with reference to John Brown, the central office requests the four members whose names appear on the card of John Brown to submit information concerning him. This information it will combine and send to the inquiring member. It will also place the name of the inquiring member on John Brown's card so that if a sixth member inquires with reference to him, the five previous members who have had dealings with him can be requested to supply information. It can be seen, therefore, that when this procedure is once established, it automatically provides for its own expansion. This procedure has proved a very valuable source of credit information, and it is to be expected that wider use will be made of it in the future.

284. Banks

Information of some value can be obtained by communicating with banks in the neighborhood where the customer is located. Such information, however, must be used with judgment, for it may be biased. If the customer who is seeking credit is a depositor of the local bank, the latter may hesitate to give information which will be detrimental to him. Although the bank may not give information which is false, it is apt to give answers which are so indefinite that they may be misleading or at least valueless. Many of the larger banks have established credit departments which collect information with reference to their customers. When it is possible to obtain the co-operation of these credit departments, information of much value can be obtained. In the larger cities the credit department of some banks co-operate with the customers of the bank in supplying information from their files.

285. Business houses

Information of much value may be obtained from business firms. Such information may be obtained from local firms which know of the local reputation of the customer seeking credit, or it may be obtained from firms of other localities from which the customer has made purchases. This information is regarded as especially valuable because business men are more apt to express unbiased opinions. The names of firms from which such information may be obtained can be secured in two ways. The customer may supply references when he makes application for credit. The information supplied by such references must be used with judgment; for it is supposed that the customer will supply the names of those

creditors with whom his relations have been most satisfactory and that if he has been slow in paying his accounts to some creditors he will not provide their names. The names of firms with which the customer has had relations may also be supplied by salesmen who, when they visit the customer, can see the brands of goods which he has in stock and, from these brands, can determine from what companies he has made purchases.

In seeking information from business houses, the credit department would profit by offering to reciprocate and to provide any information which the other company may desire to obtain.

286. Commercial paper houses

It has been explained that the commercial paper broker purchases the notes of business firms located in different localities. Consequently it is necessary for the broker to obtain comprehensive information with reference to his customers. This results in the collection of valuable data with reference to the credit standing of those customers. If it is possible for the credit man to obtain information from the files of a commercial paper broker, this information is quite useful. It is of course only in exceptional cases that such information can be obtained, for the commercial paper broker does not desire to make such information public.

287. Collection agencies

In nearly every city there are several collection agencies who devote their time to the collection of unpaid accounts. In the process of their work they gather much information with reference to the credit standing of various firms. If it is possible for the credit man to

obtain the cooperation of these agencies they can provide much useful information for him. It will of course be with reference to those firms which are of poor credit standing that these agencies will have information; but if it is found that the agency has been employed to collect the accounts of a firm, it is usually presumptive evidence that the firm's credit standing is not of the highest.

288. Lawyers

Local attorneys have an opportunity to obtain much information with reference to the business men of their community. Often they are employed in legal cases which involve the affairs of those concerned and in addition they are familiar with various court proceedings which take place. It is possible, therefore, for them to supply much useful information with reference to the credit standing of business firms. Some credit men attempt to prepare a list of attorneys to include, for each city of noticeable size, at least one attorney who will agree to supply information with reference to the merchants of his city. The chief difficulty in using this method of collecting credit data is to obtain responsible attorneys who will supply such information. Many of them resent being asked to do such work, although the same attorneys will gladly consent to collect unpaid accounts.

In order to obtain such information from attorneys at a reasonable cost, it is necessary to provide written blanks containing a few pertinent questions which the attorney can answer quite easily. When this is sent to the attorney, it should be accompanied by a remittance which is sufficient to pay him for his trouble in filling out the blank. In some cases attorneys are willing to

render this service on the prospect that, having made this contact with the vendor, they will be given the opportunity of collecting unpaid accounts if such arise.

289. National Association of Credit Men

This association has as its members credit men from all parts of the United States. It offers, indirectly, a means by which information may be obtained, since friendships and acquaintances are made through the association and these afford means of securing credit data. It should be apparent that information obtained in this manner is of great value, since it is to be expected that credit men will supply more useful information than that which can be obtained from any other source.

290. Financial reports and trade papers

In regard to customers who are corporations, it is often possible to obtain information from corporation manuals, financial papers, and periodicals. There are three or four companies which publish corporation manuals intended primarily for the use of the investor and speculator, but containing information which is of great value to the credit man.

The credit man can also obtain useful information from financial magazines which carry news items pertaining to particular firms. Clippings of these items may be made and filed so that they may later be used when it is necessary to obtain information concerning customers.

In nearly every trade there is published one or more magazines which give information of value to the credit men in a particular trade. Each credit man should avail himself of this source for obtaining data.

291. Information with reference to former customers

The foregoing discussion has dealt with the means of obtaining information pertaining to a new applicant with whom there has been no previous dealing. When a former customer asks for additional credit, all of the foregoing sources of information may be employed; but usually the first information sought is that shown by the records of the credit and accounting department. There are two reasons for this: (1) These various sources of outside information have no doubt been utilized at the time of the first order received from the customer, and, as a result of this investigation, the customer has been given a rating which is shown in the accounting and credit records. (2) The record of the customer's dealings with the company serves as a check upon the original rating. If his relations with the company confirm the original estimate of the credit department, it is unnecessary to investigate his credit in detail again, unless considerable time has elapsed since the first investigation, or unless something unfavorable in regard to him has been brought to the attention of the credit department.

292. Setting credit limits

If the original investigation of the credit of a customer shows him to be a satisfactory credit risk, it is customary to set a certain credit limit up to which his account may extend without further permission from the credit department. In many cases, this credit limit is shown on the customer's card in the accounts receivable ledger. When an order is received, it will be referred to a clerk in the credit department, and the customer's ledger record will be examined. If the sales order does not bring his indebtedness to the firm above the

credit limit which has been set, the order will be authorized without further investigation and sent to the proper department to be filled.

If the new order causes the customer's account to go beyond the credit limit originally set by the credit department, it must be referred to the head of that department or to one of his principal assistants for consideration. The credit department may decide to accept the order even though it results in extending the original credit limit allowed to the customer.

The use of a credit limit relieves the credit department of a great amount of work in passing upon orders, and, if properly used, is quite satisfactory. There are many customers who never purchase from the firm so large an amount as their financial condition would warrant. It means only useless work to have each sales order from such companies passed upon by the executives of the credit department. If this method is employed, it is necessary, however, that the credit department have up-to-date information in regard to its customers in order that it may be aware of changes in their financial condition which may be of sufficient importance to necessitate a change in the credit limit as originally established.

293. Record of customers' standing

It is customary, therefore, for the credit department to maintain some kind of a record for each of its principal customers. It is usually not necessary to maintain such a record for customers who make small intermittent purchases; and it is also not customary to set a credit limit on such customers, but to require that each order be referred to the credit department for consideration.

The records kept by the credit department may be of various kinds. Usually considerable data is collected with reference to the customer at the time of the original investigation of his credit. This will usually be filed and as new data is obtained with reference to the customer, this will be filed with the original data. The credit departments of some firms keep no other record of the individual customers and therefore turn to their files whenever information is desired. In the case of a small business this method may be satisfactory, but in the case of a business where there are many customers this procedure proves uneconomical. It is desirable, therefore, to establish a credit record for each customer and to maintain this record so as to show all essential information in regard to him. The form of this record of course will vary according to the methods of sale and the general business procedure of the firm. A typical form is shown here. By the use of a form similar to the one in the

| Name _____ | | | | Town _____ | | | | State _____ | | | | | | |
|----------------|---------|---|---|----------------|-------|------|---------|------------------|---------|-------|---------------|-------|-------|----------|
| Salesman _____ | | | | Business _____ | | | | Population _____ | | | | | | |
| SEASON | RATINGS | | | | ORDER | CANC | CHARGED | RETD | NETSALE | TERMS | PAYING RECORD | | | COMMENTS |
| | D | B | C | S | | | | | | | DISC | 4 MOS | 6 MOS | |
| S | | | | | | | | | | | | | | |
| F | | | | | | | | | | | | | | |
| S | | | | | | | | | | | | | | |
| F | | | | | | | | | | | | | | |
| S | | | | | | | | | | | | | | |

illustration, the credit department can obtain quickly the information which it may at any time need in regard to any of its regular customers. If it desires more detailed information, this can be obtained by reference to its files.

To keep such a form up to date requires considerable labor, and some credit departments prefer to turn

directly to the ledger account of a customer for the information contained in it. As this procedure, however, is apt to interfere with the work of the Accounts Receivable section, there is much to be said in favor of the credit department's maintaining a separate record. This can be accomplished without difficulty by having a copy of each voucher which affects the customer's account sent to the credit department.

294. Credit extensions by officers and employees

There is a certain tendency, especially among the officers of a company, to consider themselves as entitled, by virtue of their official positions, to extend credit as special favors and beyond the regular limitations established by the credit department. The dangers of this are: (1) There is no way to estimate such activities; and (2) the officer so extending credit seldom has any means of determining the extent of the risk he is incurring. A similar tendency may be found among employees who, without any check placed upon them, grant credit to customers.

Where a company has chosen to place the work of judging how much credit shall be extended, and to what persons, and for what length of time, in the hands of a special department under a responsible executive, it is defeating its own ends by allowing any of its other officers to extend credit independently. Where it is felt by the administration that permission to extend credit in this irregular way should be allowed, there should at least be a definite limit on the amount that may be so extended. But the simplest and safest way is to allow no extensions of credit except by members of the credit department.

Chapter XXX

Enforcing Credit Limitations

295. Relation of credit limitations to financial program

In the establishment of credit limitations it is necessary to consider not only the financial condition and the credit rating of the individual customer, but also the general credit policy of the business and the total amount of credit which the financial resources of the business will permit to be extended. It is not always desirable to extend credit to each applicant who may be a good credit risk. Each extension of credit increases the accounts receivable and the carrying of additional accounts receivable requires additional capital. Capital needs and credit extension must therefore be correlated.

Financial control depends on a systematized budgetary program, which in turn is based upon a system of control for the whole business. The regulation of credits obviously follows this principle. The purpose of credit is to permit a greater number of sales, and this fact means that production plans have to be shaped in terms of the sales program. It would be idle to estimate how large the sales should be for the coming period without also consulting the plans of the production department for the same period. Plainly enough, production is carried on in order that there may be sales; consequently any change in production plans affects the selling program.

In a similar way, since credit is closely related to the sales policies of the company, the establishing of credit limitations cannot be fixed without consulting both sales

campaign results and production planning results. A consideration of credit requirements would probably follow some such procedure as this: Before the beginning of each period the credit department would make its estimate of capital required to carry the company's anticipated accounts receivable. This would be made in terms of the sales and production results of the preceding years. As soon as the credit department has arranged its program on the basis of past records, it will call for the estimates of sales and production for the coming period. In all likelihood, the programs of these sales and production departments for the new period will be different from their programs for previous periods and the credit department would need to revise its program accordingly.

An alternate procedure is for the credit department to develop certain ratios to show the proportion of credit to be extended on sales and to apply these ratios to the sales estimate to determine the capital requirements of the credit program contemplated. It is obvious that if the credit program calls for capital beyond the resources of the business that the program will need to be revised. This might be done by revising the terms which are to be offered to customers, but this method might be impossible in a competitive trade where the terms of credit are well standardized. In such a case the sales program would have to be revised.

296. Necessity for enforcing credit limitations

In the control of credit in a business, there are certain principles that must be applied. The essential elements in credit control are the establishment of credit limitations and the enforcement of these limitations. Each of these elements is so related to the other that no credit

policy is complete which does not take both of these factors into consideration. That is, to arrive at a conclusion about the amount of credit necessary for the period without taking measures to enforce the limitations established would be to make the first principle almost valueless. A great deal of investigation and analysis must be made before the normal credit requirements can be determined with accuracy. Although the persons authorized to make contracts for the company are acquainted with the company's program for the period, this alone does not assure the financial executive that these persons have either the will or the ability to observe the program. For this there are two reasons:

1. The likelihood that salesmen, managers, or department heads will fail to report the amount of credit sales they have made and to what persons if reports to this effect are not required
2. The necessity for aiding the salesmen and other officers to carry out the program, regardless of whether they would conscientiously offer more liberal terms of credit than the condition of the company warrants.

It is but natural for a salesman to desire as large an amount of sales as possible, and this desire may cause him to lose sight of the welfare of the organization in seeking to increase his sales by offering terms of credit injurious to the company he represents. This tendency should be checked; it can be checked by installing an effective method of enforcing credit limitations so set that not only will no individual receive credit he does not deserve, but also that the total amount of credit granted will be within the budgetary limits.

The salesmen and officers should be instructed in carrying out the credit limitations program; for unless

they are given proper assistance, they may cause the credit department much work and embarrassment. Any restriction on the amount of credit to be granted must issue from the administrative officials who have seen the value of limitations for the business as a whole.

297. Methods of enforcing credit limitations

It is necessary to explain the methods by which the credit department enforces the limitations it has set. This problem will be discussed under the following headings:

1. Control over branches and departments by weekly or monthly reports on credits extended
2. Modification of sales campaigns to meet necessary credit limitations, including reports on: (a) per cent of debts found uncollectible; and (b) number of discounts offered and taken
3. Reports showing application of funds
4. Enforcement of payments by customers

298. Control over branches and departments

Probably the most obvious case of need for enforcing credit regulations is to be found in the work of the branches and departments of an organization. A natural and fairly general idea among salesmen or managers, whether it be of a department or of a branch, is that every legitimate increase of business made through their efforts or through the efforts of members of their staffs increases the prosperity of the entire organization. Sometimes this is not the case.

When more business is undesirable—Although the principal interest of any company is to sell, to sell is frequently inadvisable. Conditions in the production depart-

ment may be such that increased sales will require new equipment or new methods of organizing the labor force and, consequently, it may not be advantageous for a salesman to continue his selling activities. In a similar way, the credit facilities of a company may make it inadvisable to carry more accounts or notes receivable; consequently, a conscious effort must be made to see that the original budget is at least approximately adhered to.

Purpose of credit extensions—The charge is frequently brought against credit managers that they prevent department and branch managers from developing their opportunities to the utmost. It is true that, in an effort to keep the credit policies of his company sound, the credit man will sometimes hold the sales force down to a point below what might be a more profitable level. In the ideal credit control, the credit budget should be the means of increasing sales, by showing where collections are made regularly, and what customers are good risks and what others are bad risks. If one keeps in mind the purpose of credit, namely, to increase the number of possible transactions, it will be understood that credit management is an aggressive attempt to increase earnings rather than a defensive measure to prevent losses. As a matter of fact, the newer spirit among credit men tends not so much to make collections as to strengthen the financial condition of their present and prospective customers so that, as a result of sounder methods of conducting business, a greater volume of sales may be possible. Specifically, to carry out this purpose, the credit man co-operates with the purchaser with reference to rapid turnover of goods so that capital may not be unnecessarily tied up; and he may even, in an advisory capacity, assist the purchaser to secure additional capital.

How control is maintained—The credit department that works in this way keeps in contact with the work of its sales force by means of reports. At least once a month, the department or branch managers send in reports showing the customers to whom they have sold, the amount of credit extended, the terms, and any special comments that may aid the credit department in determining the desirability of their credit policies. This report is then compared with the records kept at the home office to see how closely the estimated credit condition of the branch or department compares with the actual condition. The information obtained by analyzing these two sets of data will indicate how closely the managers are following the budget limits; they may be justified in assuming new accounts or they may need to be warned against overstepping the limits. The reports give the credit manager a working basis for directing the further activities of the departments and branches, as well as provide data which may be useful in the preparation of the next budget.

A weekly report, although on a smaller scale than the monthly report, provides a convenient check on the amount of credit extended from one week to the next. The weekly report is frequently used as a basis from which the manager of a department compiles his monthly report.

299. Sales campaigns and credit limitations

When the credit manager compares his budget with the department reports on sales and credit, he may find that the sales show a tendency to extend beyond the credit limitations. It is, of course, desirable to have the sales as large as possible; but when the acquiring of new

accounts weakens the credit condition of the company, as by creating need for more funds than are available, then a modification must be made in the sales program. Just as the maintenance budgets must undergo changes to conform to conditions that have changed in production, so, too, must the sales program be modified to comply with the best interests of the company from the point of view of the credit department.

No matter how carefully the credit program may be worked out, there may arise conditions which will alter the original plans—a change in the money market; or, if the community is agricultural, poor crops; or collections may be slower than was expected. Under such conditions if the original sales estimate is maintained, the credit responsibilities of the company will probably increase to a point where it will have to extend its credit relations with the bank and with trade creditors. Rather than do this, the company may find it necessary to revise the sales program in accordance with the credit situation.

Necessary credit data—At the beginning of a period it is desirable to have some such data as the following:

1. Sales last year
2. Collections last year
 - a. Discounted accounts
 - b. Accounts paid net
 - c. Slow accounts
3. Bad debts
4. Sales estimate this year

By comparing such data with the present outlook, the credit manager can determine fairly well the probabilities for the present period. When the financial market shows little variation, the compilation of the new budget is comparatively simple. A new credit schedule is drawn up by applying the percentages for previous

periods to the present sales program. However, no matter how carefully the budget may be drawn up, modifications will have to be made not only in the sales program but possibly also in the credit plans. The information according to which these modifications are made comes from: (1) the general situation as viewed by financial experts; and (2) the records of the credit department showing the special conditions within the business.

As to the former type of information, namely, reports on general business conditions, the data are available to all business men. But information on the conditions within the business requires special consideration, since it can be secured only by maintaining records of the progress of the accounts and sales. One way of gathering this information is to have the credit department keep a file showing on summary cards, for each customer:

1. Whether the customer discounted his bills
2. Whether he paid them at the net date
3. Whether he was slow and why
4. Whether he passed payment altogether and why

When this information is transferred from the cards to reports, the credit manager is equipped with useful information with which to proceed in drawing up a budget.

What the budgets should show—Finally, it is necessary to explain the two budgets which make possible the control of credit: (1) the original budget; and (2) the monthly modification budget which enforces, as nearly as possible, the limitations set by the original budget.

The following columns would be included in the original budget made out at the beginning of a period:

1. Sales last year
2. Collections last year
3. Estimated sales this year
4. Revisions
 - a. Sales—increase or decrease
 - b. Collections—increase or decrease
5. Final estimate for sales
6. Final estimate for collections
7. Actual sales
8. Actual collections
9. Per cent increase or decrease of actual sales over estimate
10. Per cent increase or decrease of collections over estimate
11. Per cent increase or decrease this year's sales over last year's
12. Per cent increase or decrease this year's collections over last year's

After the original budget has been made on the basis of past records and present prospects, it becomes necessary to enforce this program from month to month. This will take the form of a revised budget, including

1. Month for which the report is made
2. Accounts Receivable estimated
3. Collections estimated
4. Per cent estimated collections to Accounts Receivable estimated
5. Accounts Receivable actual
6. Collections actual
7. Per cent actual collections to Accounts Receivable
8. Amount of collections behind or ahead
9. Per cent collections behind or ahead

300. *Constructive assistance to the customer*

Being provided with the information outlined in the preceding discussion, a modern credit department finds it a fairly simple matter to advance a step beyond its original purpose of protecting its company from losses, to the broader purpose of helping the customer to build up his business. Every business has its own particular methods of selling and paying, so that the actual problems which the credit man is likely to face differ greatly. Consequently, one cannot offer any definite principles for conducting this part of the credit work other than the general one that, by educating the customer to use proper records and to maintain proper relations between current assets and current liabilities, the customer may be enabled to develop his business to the point where he can obtain more liberal credit and hence to buy in larger quantities. It therefore becomes a part of the work of the credit department:

1. To analyze the business of the customer so as to determine the liquidity of his funds

2. To recommend new forms of records which will serve as a better guide to the financial condition of its customers

3. To exceed in some cases the limitations set on the amount of credit the customer may receive when this is necessary in order to prevent bankruptcy or loss of the customer's business. (This should be done only when the solvency of the customer is fairly certain, and only after permission from the proper authorities has been obtained.)

In regard to the first of the above activities, it is naturally to the creditor company's interest to receive payment for its goods as quickly as possible; consequently, it is desirous of placing the purchaser's capital in as liquid a condition as possible. Accordingly some

compute the turnover ratio and the proper operating costs for handling the goods. If it is found that the customer's turnover is too slow or that his operating expenses are too large, the credit department informs him of this fact and offers to help the customer to correct the error.

Sometimes an examination of the records of the buying company shows that the statistics for the financial condition of the company do not present a sufficiently clear view. In a spirit of co-operation the credit department may then suggest a revision of the records. To some extent its own criticism may be a sufficient guide for the debtor organization to follow; but usually, provided the buying company accepts the creditor's judgment, the consultation of an accountant is then sought.

Finally there may be times when, because of a stringency in the money market, the purchaser is not in a position to pay as promptly as is his usual custom. If the past record of the purchaser is favorable and if the condition of his capital at the time is satisfactory, the creditor company may be willing to grant credit beyond the limitations set. This may be either because the creditor company does not want to lose the customer's business, or because of a desire to save the customer from financial embarrassment.

301. Application of funds

After the credit control program has been enforced to the extent of checking up the activities of the branches and departments, revising the sales program in accordance with the credit limitations, and enforcing the restrictions on credit extensions to customers, there is left only the bringing together of all this work into a final report. Since the budget made at the beginning showed how the

funds were to be applied, the logical conclusion of the credit control for the period would be to indicate how the funds actually were applied.

The necessary data being assembled, it is an easy matter to summarize it so as to show from what sources funds were received and for what purposes they were applied. The purpose of this procedure is two-fold: to reduce to summary form the entire work of the period devoted to enforcing the credit program; and to provide a statement of the past uses of credit which may be used as a basis for estimating the credit to be extended during the next period. It is far better to have this information condensed into one report, both for the convenience of the credit department and for the use of members of the firm or the banks. A summary report is far more desirable for the purpose of drawing up plans for the next period.

302. Need for enforcing collections

No matter how carefully the granting of credit may be supervised or how effectively the credit limitations may be enforced, there will be some customers who will not willingly fulfill the terms of their contract. It is necessary, therefore, for the vendor to take measures to enforce payment. Usually these measures are carried out by a collection department which is a part of the credit department. It is necessary to discuss briefly the procedure by which the credit department performs this task.

303. Handling collections

The practices of business firms vary greatly in regard to the handling of collections. In some firms a copy of each sales invoice is sent to the credit department

and is filed under the date of payment. If this method is followed, it is necessary to have some means of determining whether the invoices are paid when due. One method is for the credit department to remove from the file each day all invoices falling due on that date and to send them to the accounting department. The accounting department checks these invoices against the ledger accounts and returns to the credit department those which have not been paid. The credit department may then request the customer to remit and file the invoices under a date a short time in advance so that if the remittance is not made promptly, the collection can be followed up.

Another method is for the cashier to prepare in duplicate a settlement sheet for each remittance received from the customer. These settlement sheets are sent to the Accounts Receivable section, and then, after they have been compared with the ledger account and filled in in the proper manner, a copy is sent to the credit department. From these sheets the credit department can determine the invoices which have been paid and remove them from its file.

In other businesses, the credit department does not receive a copy of the invoice, but, instead, a copy of the statement which is sent to the customer at the end of the month. If the statements are sent at the end of the month, they should be paid within a reasonable length of time thereafter. The time of payment depends upon the terms which have been made with the customer or upon the customs of the trade. For instance, in some lines of business, statements are sent to the customer on the first day of the month with the understanding that they are to be paid on or before the fifteenth day of the month. The credit department files copies of these statements

under the dates when they are expected to be paid. When remittances are received, a copy of the settlement sheet is sent to the credit department and, by means of these sheets the credit department can determine what statements have been paid. Those which are paid are removed from the files; the statements which are not paid according to the terms agreed upon are removed from the files, and letters are written reminding the customers of their failure to pay at the proper time, and requesting remittance. The unpaid statements will then be refiled under dates a short time in the future, and if not paid by that time, a second letter will be sent. The statements may be filed again under a future date, and action taken if payment is not made. To illustrate: a statement may be sent on the first of the month with the understanding that it is to be paid on or before the fifteenth day of the month. The credit department will file a copy of the statement under date of the fifteenth of the month. Letters will be sent to all customers who have not paid by the fifteenth, and statements will be filed under date of the twenty-fifth. Another letter will be sent to those who have not paid by the twenty-fifth, and the statements will be filed so that they will present themselves automatically in another ten days. By this means there is no danger that there will be a failure to follow up a delinquent customer, since the statements which require action each day will be automatically brought to the attention of the proper person.

There are various methods of handling collections, but it is thought that those discussed are sufficiently typical to give a general idea of collection procedure. It should be emphasized in this connection that, regardless of the amount of information which may be kept by

the credit department, the final and authoritative record of the relation of the customer to the business is his account in the Accounts Receivable ledger. It is very desirable, therefore, that this record be kept accurate and up to date. In order to accomplish this, all sales should be entered to the debit of the customer's account immediately. This can be accomplished easily by sending a copy of the sales invoice to the Accounts Receivable section of the accounting department so that entries may be made from these daily. In some small businesses where a detailed sales journal is kept, postings are made from this to the Accounts Receivable ledger. If this practice is followed, the posting should be made daily and not delayed until the end of the month when the postings are made to the general ledger.

In the same manner, the credits to the customers' accounts should be made daily from settlement sheets, remittance slips, or the cash record, and should not be postponed until the cash record is posted at the end of the month. The terms of sale should be placed in the explanation column of the customer's account. It is also well to indicate, on the credit side, the method and time of payment by the customer. The time of payment is, of course, indicated by the date. If the customer pays cash, this may be indicated in the explanation, or the practice may be followed of indicating all methods of payment other than cash and assuming that, when no explanation is given, cash payment is to be made. If a customer gives a trade acceptance or note in settlement of his account, this fact will be shown in the explanation column. If the customer does not pay the acceptance or note when it becomes due, it should be charged back to his account and taken out of the Notes Receivable

account. By this means the account will show at any time in the future that the customer has dishonored his acceptance or note, and this is very important information from a credit viewpoint. If the acceptance or note is worthless or doubtful, it should be immediately taken out of the account and charged to the debit of Reserve for Bad Debts, or for Doubtful Accounts, but it should be passed through the customer's account so that this essential information of dishonor will be shown in his account.

VIII. Relation of Bookkeeping and Auditing to Financial Control

Chapter XXXI

Bookkeeping Statistics and Auditing

304. Procedure and data essential for control

In the exercise of control over the financial operations of a business, the following steps are necessary:

1. To determine the capital requirements of the business in advance of each budget period
2. To determine the source from which the capital is to be secured
3. To determine the method which is to be employed in obtaining the capital desired
4. To exercise control over the disbursement of funds so as to ensure their use for the purposes for which they were intended
5. To consider the cash requirements of the business so as to keep the funds of the business invested in such a manner that the day-to-day cash demands can be met

The execution of the program of financial control as given in the preceding outline necessitates the making of estimates, the formulation of judgments, and the issuing of instructions for procedure. Such estimates, judgments, and instructions, in order to be trustworthy, must be based on accurate and comprehensive information; and this information must be obtained in large part from the accounting and statistical records of the business. Such

records must not only be kept, but the information which they contain must be analyzed, presented, and interpreted, if proper judgments are to be made and proper action taken.

305. Responsibility for accounting and statistical data

In every business of material size there is some one who is vested with direct executive control of the accounting organization. The executive head of the accounting organization is known by various names. He may be called "General Accountant," "Plant Accountant," "General Auditor," or by another similar title. In some cases the "Controller" of the company exercises direct and immediate supervision of the accounting department. This, however, is not the true function of a controller. Sometimes an "Assistant Controller" exercises this function. The terminology of accounting is not exact, and the titles employed to designate those employed in accounting work are not standardized. In the present discussion the term "General Auditor" will refer to the accounting executive who is responsible for the proper keeping of the accounting records and for the preparation of the necessary financial and statistical reports therefrom. This last duty makes it necessary that the other department reports be filed with him.

306. Duties of the general auditor

It is the duty of the general auditor to see that the information which is necessary to serve as a basis for the management and control of the business is made available for the use of those who are to exercise this control. In order that he may accomplish this task, it is necessary that he do four things:

1. He must design the reports which are necessary to present the desired information to the executive officers. The preparation of such reports is one of the most important tasks which the auditor has to perform.

2. He must design a classification of accounts which will provide for a proper analysis and classification of the information which is to be presented by means of reports to the executives. Without such a classification of accounts, the collection of accurate data is impossible.

3. He must design a system of records which will serve as posting mediums to the accounts. Without such records it is impossible effectively and accurately to collect and to summarize the information which is contained in the accounts.

4. He must design standard voucher forms which will serve as a means of summarizing the details and of transferring these details from the one who is originally responsible for them to the one who is to make a summarized record of them.

The designing of such reports, accounts, records, and vouchers involves the entire accounting process. In other words, it involves this process from the time each transaction is performed until the effect of that transaction on the business is presented to the executives of the company by means of a report. The various steps in the accounting process are named in the above outline in the order of their importance. Chronologically, however, these steps are performed in the opposite order from which they are there named. In other words, the voucher is prepared first and the report is prepared last. In the discussion, the chronological order will be followed.

307. Voucher reports

Every transaction that is effected by the company must be placed on record in order that the various depart-

ments of the business may know what is happening from day to day. When a sale is made, the department responsible for that sale is not the only one interested in a report of it. The treasurer must know about it in order to keep account of the ultimate resources of the company. The production manager has an interest in a report of the sale, because it indicates to him what is needed in the way of more production in order to meet the demand of purchasers. The purchasing department may be required to secure more materials from the outside, and, finally, the general manager and president will want to know the condition of the business.

Vouchers must show source of transactions and responsibility—Consequently, it is important that the elementary records of transactions be so arranged that when they reach the accounting department they may be correctly recorded on the ledgers. Since the purpose of the management is to provide a means for controlling the activities of the business and for directing the work of the executive heads of the various departments, a definite, standardized method of reporting must be employed. The only possible way for accomplishing this is to have the records so organized that they will indicate the source from which the transactions have originated and the responsibility for incurring them.

Importance of the voucher—The general auditor makes the accounting and statistical information available for use. He serves as a central force to which all the records of transactions are brought and placed on the books. The nature of this position suggests that he must not only see that the records are made but also that they are made for the purpose of interpreting the activities of the entire business. In the making of such records,

voucher reports are indispensable as a means of summarizing and transferring information. As the basis of all the accounting and statistical information, it is essential that the vouchers shall conform to the principles of co-ordination and correlation in business activities.

308. Daily, weekly, and monthly vouchers from officers

No attempt to have accurate accounting records can be successfully carried through unless the first steps in this procedure are properly taken. Specifically, this means that the first essential in the use of journal vouchers is to have them available for the accounting department sufficiently in advance of the time when the accounting reports are expected that the necessary work preliminary to the preparation of the reports may be performed.

How the vouchers are used—It may be well to illustrate a desirable plan in using voucher reports. In any business where there is any considerable amount of accounting or statistical work to be performed by the accounting department, it is desirable that the department be organized into sections, each section dealing with one phase of the accounting work. In pursuance of this policy, there may be an "Accounts Receivable" section which handles all the records dealing with the accounts with customers; an "Accounts Payable" section which performs a similar function in connection with the accounts of creditors; a "Pay-Roll" section which records all the details with reference to the pay-roll; and other sections performing specialized duties. In this case it is necessary to have one section usually termed the "General Accounting" section which makes a summarized record of the information dealt with by all the other sec-

tion from other sections of the accounting department to the General Accounting section, they may be used also to transfer such information from branches and divisions to the General Office. Their use in the latter connection makes it possible to centralize control without the employment of prohibitive detail.

Necessity for prompt reports—In order to make certain that all the transactions will be recorded and that they will be recorded correctly, these vouchers must be sent into the auditing department promptly. Were the department originally responsible for a sale or a purchase or for some other transaction the only party concerned, the question of when the record shall be transferred from the books of original entry to the ledger would be relatively unimportant. But the accounts in the ledgers are themselves the basis of executive reports, therefore any delay or error in entering the original records will affect all the subsequent statistical procedure. Accordingly, not only a desirable but, in fact, a necessary feature in the use of journal reports is that those who are responsible for the making and transmission of journal voucher reports should do that work promptly. For example, when a sale is made, it is entered upon an invoice giving the data with reference to the conditions of sale. The information on the invoice is then transferred to the journals. Any delay in the reporting of journal data will clog the entire procedure.

Dangers of delay—In addition to the disadvantages from delay in placing the information on the books, there is the further difficulty and possible danger that, in allowing unnecessary time to elapse, certain data will not be recorded. When hundreds of items are coming through a bookkeeping department to be posted to a department

account, it is no simple task to check up on the work of the numerous clerks who are doing the posting. It is quite possible that in handling such an amount of detail a few items will be unintentionally omitted from the ledger. The result is that in the making of the reports there will be unavoidable omissions; and, therefore, that the reports will not reflect the true condition of the business.

The first requisite of a well-organized auditing system is to have the voucher reports made regularly. Once this requirement is recognized, it is clear that it involves co-operation of the employes and officers with the general auditor and his staff. While the head of the accounting department must be responsible for recording the information given in the journals, he cannot be expected to accomplish this work unless those who have charge of the original transactions make prompt report to him. They can be made to appreciate their part in this relationship only by being required to fill out and to transmit each form within a certain prescribed time.

309. Designing records

In order to avoid having an unorganized array of accounts, the auditor must devise the accounting records so that they may be the means of accurately collecting the information which is to be placed in the accounts. If it is realized that the records are a stepping stone between the first record of the transaction on the voucher report and the accounts which are the final basis of information for the reports to be sent to the executive, it is clear that not only is it important to have records, but that it is equally important for the records to be indicative of the system of control.

Methods of procedure—To answer the requirements of an accounting system that is at once complete and yet simple in the facility with which it can indicate control, these records must give information concerning all the departments in the organization and yet be in such summarized form that unnecessary details are eliminated. These requirements are not easily met, for before the records themselves can be devised there must exist an understanding and appreciation of the needs of the entire business. An understanding of this sort cannot arise from any purely theoretical analysis of the probable lines of activity and methods of procedure, nor can it be the product of a general auditor's "a priori" reasoning. There are many men occupying positions as general auditors who draw up records for their company and who believe it to be their duty to evolve, from their own thoughts, plans of accounting organization and then to put these plans into operation. If this method is followed, in order to maintain a uniform style of record throughout the plant, some departments have to accept forms that are not suited to their needs. When an agreement between the plans of the auditor and the practical conclusions of the functional executive cannot be reached, one of two situations must follow: Either the auditor and the executives will be working at cross purposes; or the executives will disregard the suggestions made to them by the auditor.

To explain the reason for such circumstances, it is only necessary to point out that for an auditor to construct a plan for records into which data must be fitted is to attempt the adjustment of the actual needs and conditions of the business to the product of a theory. Since the men who know the needs and conditions hold a different

view from that held by the man who devised the plan, it is highly improbable that harmony in administration can exist. When there is a lack of harmony, it may safely be inferred that neither group will be able to effect a successful organization.

Instead of pursuing so ineffective a method of designing records, the auditor should first make himself intimately acquainted with the nature of the administrative organization and with the needs of the departments. After investigating the actual conditions and circumstances, he can outline a suitable accounting organization.

It may be questioned how much importance the auditor should place on the suggestions made to him by the departmental executives with whom he consults, assuming that the auditor has the interests of the company as a whole in mind, while the other men are more especially concerned with their particular and more limited departments. Granted that this is true, it still is important that there be an interchange of opinion, as well as a mutual understanding of facts. The records are to be an active means of maintaining information in regard to the operations of the business so that, through the use of budgets to be made up from those records, a comprehensive control may be exercised over its finances. In order to be assured that the records will be a vital force, they must be planned on the basis of existing conditions. This does not mean that they may not be adjusted to the broader and more far-sighted considerations of the auditor.

310. Classification of accounts

Following the organization of records for the maintenance of information about the business, it is necessary

that the accounts themselves be classified in such a way that the officers and employees may be enabled to transmit information concerning the transactions for which they are responsible so that it may be correctly put into the accounts. The information for the analysis of accounting and statistical records must be analyzed, presented, and interpreted. In other words, the ideal in accounting control requires an organization of the collected material as well as of the original sources of information so that, from the beginning of the process to the final correlation, the data may be considered relative to the controlling functions of the business.

It is conceivable that the officers and directors of the business in transferring their voucher reports might present them according to a purely chronological scheme. Upon receiving the vouchers, the auditing department would be required to do one of two things: it must either record the information exactly as it appears in the journal reports, and thus make it even more difficult for the next official to interpret the information recorded in the ledger; or it must re-work the voucher data before posting it. The latter procedure would be practically impossible.

The general auditor should have the accounts so classified that when information concerning business transactions comes to his department to be placed in the accounts, it may be received into an accounting organization in full harmony with the general accounting system. To make this possible, the accounts must be classified on the basis of individual responsibility for the various transactions; for if the voucher reports are to proceed to the auditing department in an orderly manner (by way of the employees and officers who are responsible for the

transactions), then the final recording of the information contained in those vouchers must be adapted to that procedure. Accordingly the various and numerous accounts must be arranged in such a way that as reports of transactions come into the auditor's department, these reports may be readily related to the accounts in which they are to be recorded.

The extent of such a plan may be realized when it is considered that each department has its sub-departments, and that each of these may have subsidiaries. In a business of any noticeable size, where the functions of purchasing or production (or both), and selling, finance, and administration are developed, the number of accounts becomes large; and when it is desired to secure something more than a mere listing of the accounts or when an organization and classification of the accounts is sought, the task thus before the auditor and his staff is a rather formidable one. In order to accomplish such a classification, it is necessary:

1. To analyze the business from the viewpoint of the functions of the business
2. To determine the relation between controlling and subsidiary ledgers
3. To group the accounts under these ledgers so that the information contained in them will be available for the purpose of control

Chapter XXXII

Bookkeeping Statistics and Auditing—*Continued*

311. Importance of designed journal reports and records

Up to this point the discussion has been concerned with developing a system and organization of the accounting records to place the data with reference to the transactions of a business not only in permanent but also in useful form. The application and interpretation of this information and also the organization of the auditing department by which the work is to be carried on will now be considered.

312. Reports to the auditor

In taking up the reports to be made by the auditing department it may seem that only one group of reports need be considered, namely, those that go from the auditor to the executives. However, before the nature of these can be thoroughly understood, it is desirable that some consideration be given to the devices by which information is transmitted from the subsidiary departments of the business—the divisions and branches—to the auditor. These devices include:

1. Daily, weekly, and monthly reports from division and branch officers to the auditor
2. Use of local files of these reports in estimating accounts from day to day
3. Weekly and monthly recapitulation of monthly files and check against reports by the auditor
4. Sub-ledgers and controlling accounts

While all information in regard to the transactions of the business are recorded and are available for the use of the auditor, the time required for entering the information into the books may be too long for him to wait for it. He may therefore require summarized reports on the financial condition of the business to be sent directly to him. Such reports may come daily, weekly, or monthly, depending on the nature of the information and the necessity for receiving it promptly. Reports on cash receipts would be made daily. In order that the auditor may make proper report to the treasurer, he must himself receive frequent reports concerning the cash receipts. These reports may be made daily in a summarized form.

For a similar purpose, weekly reports on cash disbursements should be submitted to the auditor. The regulation of the cash minimum must be continued throughout the period, for the amount of the cash fund varies from week to week as a result of the continual variety of transactions in the business. Accordingly, the weekly report on cash disbursements provides a basis on which the working fund may be replenished. The necessary information is transmitted from the auditor to the officials of the company who are responsible for cash outlays and to the controller who is interested in judging the effectiveness with which the accounting reports are made.

As an example of monthly reports, the report on sales from the branches and divisions may be suggested. During the activities of a month, it is quite possible that circumstances may alter the sales from what was estimated for the period. Inasmuch as the condition of sales reflects back upon production demands and, in fact, upon practically every function of the business, it would seem

desirable to check up as often as it is convenient on the relation of actual to estimated sales. A further reason for requiring a monthly sales report is that such a report keeps the general office in touch with activities at the branches and divisions and so provides a controlling device for the central executive.

Reports are basis for daily estimates—Considering the entire group of reports discussed above, it is clear that with them as a basis one may estimate accounts from day to day. It is desirable that each executive who is interested in or responsible for any of the several functions of the business should maintain his own files of these daily, weekly, and monthly reports as they come in. He may then proceed to estimate, independent of any formal budgets, the prospective conditions from day to day within his own department. Such a practice promotes executive control. An official at the head of any one of the functional departments should be able to sense the immediate and future conditions over which he has authority in order that he may correct any defects as they arise or re-adjust the estimates to the actual conditions. To carry out this idea in control, the executive must have as complete information with regard to the business as can be provided by the auditing department. This includes the maintenance of files by the various executives themselves.

Checking up on the value of the reports—Such a collection of filed records is useful also to the auditor. It provides him with the means of checking up the work of his own department and is an additional source of information which will be found useful in the making of statistical reports. As reports come to him from the branches and divisions, the auditor may make compari-

sons between the estimated and the actual results of operations. While it is the controller who interprets the reports, it is the auditor who must learn for himself how effectively the records designed by him are providing information and what revisions or additions may be needed in order to increase that effectiveness.

As a further check on the success of the records, it is desirable to make a comparison between the weekly and monthly recapitulations of the information in the files and the reports made by the auditor. By placing these two sets of data against each other, it is possible for the auditor to make a comparison between the actual performance for the period, as seen by the branch executives, and his own estimate of what the performance would be. Ideally an agreement should be found between these two groups, but variations may arise either because of different methods of reporting information or because of differences in the information itself. This comparison will bring the variations into relief and will thus enable the auditor to investigate their cause. The ultimate correction that is to be made will be based on a desire to increase the value of the information to be presented in the reports.

It may seem that too much importance is being laid on the method of presenting information. There is, however, relatively little value in a mass of details, as such, for they tend rather to confuse executives than to enlighten them concerning the conditions that exist. It is only by having details grouped according to the purposes of the administrative control and the ends to be attained that they can be made available for increasing the effectiveness of control. Any comparison such as those here suggested, which will help the auditor in his

purpose of developing methods of reporting information, should be given careful consideration.

Finally, as the auditor receives information from the divisions and branches, a distinction should be made between the data to be entered in the controlling accounts and the data to be entered in the sub-ledgers. Details are useless for purposes of control. Consequently, since it is from the controlling accounts that information is taken for the reports which are to be given to the executive staff, it is desirable that only the information which is valuable for these final reports be placed in the general ledger, that is, the summarized accounts of transactions should be the only data to be presented in the controlling ledgers, while the sub-ledgers are the logical place for retaining the more elaborate and detailed data concerning the various transactions.

313. Reports from the auditor

In one sense the auditing department is the concentration plant for information relative to the activities of the business. It must collect all the data and statistics from the various departments and divisions of the business and, following that, must transmit the data in digested form to the executives. But there is equally as much importance to be placed on the methods of making the reports that pass out from the auditor's office as upon the methods of recording and reporting information to the auditor. It is impossible for any executive to read intelligently a great collection of unorganized information. Even if he could absorb all the material provided and had the necessary time he probably would not be willing to do so. His interest in the reports is not in receiving a history of transactions for a certain period so

that he may know how many units of goods have been produced or how great was the amount of sales, but rather in judging, from the information which the report contains, how efficiently the operations of the business are being conducted. Consequently the reports must be stated in such form that they will, at one and the same time, both provide and interpret information.

Interpreting the accounts—In order to carry out further the interpretative point of view, the presenting of the financial statements in percentages will be exceedingly helpful. It is difficult for a reader to compare unless he is willing or has the time to make his own percentages. The accounting department should make the showing of percentage relationships between the various accounts as part of its reporting work. Such comparisons show at once how effectively certain kinds of work are being performed. The per cent sign might be likened to a "Stop, Look, and Listen" guide, since it calls the executive's attention to the results of past operations and so suggests what is desirable to do in the future. Among the percentage relationships that are particularly significant are:

1. Percentage of total sales to operating expenses
2. Percentage of sales to cost of goods sold
3. Percentage of collections to sales
4. Percentage of net profits to sales

Just as it is found desirable to make comparisons between the various accounts, so it will be found desirable to make comparison between the statements of accounts and the budget. The former shows what has actually taken place during the period and the latter shows what was planned to take place. It would be a most unusual period or business where the estimated and actual con-

ditions tallied, for no matter how carefully the analysis preceding the making of the budget may be made, conditions will arise, either within the business or in the general financial, trade, and production world, which will create differences between the budget and the report of the actual transactions. In order that an understanding of these differences may be had before the next budget is to be drawn up, the auditor should make the necessary comparisons and show them in his reports to the executive. A study of the reports will possibly suggest to him desirable modifications in the method of making the budgets or may suggest to him certain changes in business procedure which will reduce the variations between the estimated and the actual results. Such comparisons between the periodic statements and the budgets may be made for a whole period, as for a year, or for sub-periods, as a month, or a quarter. Whatever the length of time the purpose should remain the same, namely, to provide means for controlling the operations of the budgetary program.

Finally, the budgets themselves must be presented in such form that they may anticipate the needs of the executives who are to control the transactions. Accordingly, the form of the budget must correspond to the functions of the business; and where any subsidiary budgets are used, they must indicate the significant elements to be controlled by them. Usually, besides the general estimate on the prospective financial condition of the business, there will be a budget on sales, a budget on purchases, another on cash receipts and disbursements, and so on. Besides giving the original budget in practicable form, the plan should provide for a revised budget. The estimate contained in the original budget

serves as a guide for the coming period, the revisions in the secondary budget serve as checks by which to determine the effectiveness of control over operations through the use of the budget. These revised budgets should be made at intervals during the period, usually monthly, and should cover the following phases of each transaction:

1. The estimated
2. The actual
3. The per cent of actual to estimated
4. The revised estimate

314. The auditing organization

With so important a task to perform, namely, to present such information concerning the transactions of the business as will be helpful to the executives in exercising control over its operations, the auditor should be provided with sufficient means for doing the work in a satisfactory manner. The organization of the auditing department may be considered from the following viewpoints:

1. The relation of outside auditors to the company auditor
2. The auditor and his functional representatives
3. The auditor and the bookkeeping staff
4. The auditor's relation to statistics

The general conception of an auditing organization includes first of all an outside auditor who, usually, is supposed to pass on the accuracy of the records of the company and the condition of the business. Without the approval of an outside auditor, the work of the company auditor would be lacking a certain confidence; for the former makes his judgment in an impersonal way without the bias that quite naturally may arise in one who

is associated with the activities of only one particular business. The functions of the outside auditor may vary from those of checking up on work that has already been performed to those of making constructive suggestions for improving the methods of transmitting information to the executive. Because of a lack of standardization in terminology, this auditor may be called "Certified Public Accountant," or "Consulting Accountant." Whatever his title, the professional man outside of the company who is engaged to investigate the accounting records of the company is valuable principally for the new point of view presented in his analysis and for the broader ideas which he can offer by reason of his more varied experience.

Within the organization, the company auditor is assisted by his functional representatives, who serve as links between the auditing department and the various other departments of the business, as selling, purchasing, and production. If the auditor devises the records for receiving information with reference to the various transactions in each of these departments, he should have the opportunity of seeing that the records are properly used and that the required information is placed on the records in accordance with the orders of the auditing department. This may be accomplished best by having functional representatives who will be responsible for the entering of information on the records within the several departments. As an example of such an assistant to the auditor, the case may be cited of a large production department whose Balance of Stores Record showed that 6600 units of a certain commodity produced were on hand, whereas on investigating and actual count the number of units existing were found to be only 550. The difference

resulted from faulty maintenance of the Balance of Stores Record. This error could have been avoided by having in the production department an assistant to the auditor who would see that the facts were properly recorded.

In addition to checking up on the effectiveness with which records are made by the various departments, the auditor must control the activities of the bookkeeping staff. Two things are essential in transmitting data to the books of the auditing department: (1) accuracy, and (2) completeness. For a company of large size the number of bookkeepers is very great. Their duties relative to recording data as it comes through from the departments should be clearly outlined so as to avoid any overlapping of purpose or duplication of effort. It may be necessary to divide the staff into various groups, certain ones taking care of special accounts, such as accounts receivable, accounts payable, purchases, cost accounting, and the like, with a general bookkeeping group to correlate the work of the subordinate departments.

Finally, the auditor is concerned with the developing of statistics to aid him in the further designing of records and reports. When the extent of the operations is sufficiently elaborate, it may be necessary to have a separate group of assistants to take the information that is transmitted to the bookkeeping department and reduce it to statistical form. Such a procedure is valuable also to the controller and may be supervised by him rather than by the auditor, according to the organization of the particular plant. If it is not possible to have separate statistical assistants, it should be possible at least to have separate files of the bookkeeping data which may be converted into statistical form.

Chapter XXXIII

Organization of Controllershship

315. Duties of the controller

The controller is one of the principal executives of the business. He is usually elected by the Board of Directors and is responsible directly to them, although subject to the executive direction of the president. In order that his work may be effective, he should have the same official standing as the executives in charge of sales, production, and finance. Otherwise he is apt to have difficulty in obtaining the co-operation which is necessary for the successful accomplishment of his task.

The controller should be the final authority on accounting methods and procedure, but should not be directly responsible for the execution of the work. He should be held responsible for the interpretation of the accounting reports and should submit to the other executives of the company recommendations touching the matters to which they relate. He is responsible for the use of the accounts rather than for their preparation.

316. Illustration of the duties of the controller

The duties of the controller will vary with the organization of the particular business. In some cases, in addition to performing the function of controller, the controller performs also the function of an auditor. Some of the duties which should be performed by an auditor may be performed by an assistant to the controller. This is only a variation in terminology, however, and not a variation in the principles previously

stated. In order to illustrate the duties of a controller in a comprehensive and concrete way, the following quotation from the "General Orders" of a large corporation is given:

GENERAL ORDER

| | |
|----------|------------------------------------------|
| | Order No. |
| To: | All Executives of the Company for action |
| To: | Others for information |
| Subject: | Office of Controller |

A. Establishment of Position

The position of controller is hereby established as of the date of this order.

B. Jurisdiction

Under the direct authority of the president the controller will have jurisdiction over the following functions:

1. General Accounting

- Preparing all consolidated division, branch, and subsidiary company balance sheets, profit and loss statements, income and expense analysis, subject to the authorization of the president in the case of all reserves for depreciation, doubtful accounts, etc.
- Keeping all consolidated division, branch and subsidiary company general ledgers, journals, and other general accounting records

2 Accounts Receivable

- Keeping all division, branch, and subsidiary company receivable ledgers, journals, and cashbooks
- Preparing all statements of customers' accounts
- Corresponding with customers concerning routine errors in receivable accounts and statements

3. Accounts Payable and Pay-Roll Accounting

a. Invoice Payable

- (1) Vouchering for payment or credit (or reimbursement to the paying unit in the case of branch and subsidiary company payments) all incoming invoices or other evidences of the company's indebtedness
- (2) Distributing such payments or credits to the appropriate accounts
- (3) Maintaining files of such charges against the company

- b. **Pay-Roll Accounting**
 - (1) Extending and auditing all employees' time records
 - (2) Keeping all pay-roll ledgers showing earnings and deductions by departments and individuals
- 4. **Inventory Accounting**
 - a. Recording and reporting the following inventories subject to the instructions of the president as to the basis of valuation:
 - (1) Land and buildings
 - (2) Equipment
 - (3) Finished stock, including part stock and resale material
 - (4) Costing stores
 - (5) Work in process
 - (6) Raw material stores
 - (7) Supplies
 - (8) Tools
 - (9) Scrap
 - b. Conducting all physical inventories of above classes of material
- 5. **Factory Costs**
 - a. **Operating Costs**
Recording and reporting all works operating costs
 - b. **Production Costs**
 - (1) **Class Costs**
 - a. Estimating the class pound cost of standard products under the requirements of General Order
 - (2) **Unit Costs**
 - a. Estimating the unit cost on products by applying actual time and material records as required under General Order
 - b. Maintaining such unit costs on Standard material on basis of increase or decrease in class cost or actual time and material records as required under General Order
 - c. Comparing factory cost estimates with estimated unit cost on all special material
 - c. **Works Expense Order Costs**
Estimating costs on all works expense orders and reporting all such costs in excess of the limit stipulated for such expense orders

6. Appropriations for Expenditures

Costing all major and minor appropriations for expenditure and comparing actual with estimated costs

7. Statistics

Preparing all statistical data other than that hereinbefore provided for or implied, including intra-departmental statistics requiring the use of computing or tabulating devices or knowledge of statistical methods; with special reference to:

a. Classifying and Tabulating of Sales

(1) Classifying and tabulating all charges against customers by engineering or non-engineering orders, by product classes, by type of shipment, and by selling unit, state, sales territory, and customer

(2) Classifying and tabulating all inter-company charges by product classes by type of shipment, and inter-company selling unit

b. Costing of Branch Sales

Costing all branch charges against customers to show by items and classes margin between selling price and replacement cost

c. Works Production, Shipment, Shortage, and Surplus Statistics

Recording and reporting production, shipments, shortages, and surplus by weight, group, and class

d. Works Order Source and Shipment Destination

Reporting and recording orders received, cancellations, net orders received, and shipments for each works and for both works by selling units

8. Invoicing

a. Figuring all customers and inter-company charges and all outgoing vendor and inter-company debit and credit memoranda, and preparing all invoices and debit and credit memoranda therefrom

b. Registering shipments to insure billing thereof (including direct shipments from vendors)

c. Corresponding as to invoicing errors

9. Forms

a. Reviewing all forms used by the company

b. Preparing all forms directly employed in connection with the above outlined functions and approving all forms necessary to the efficient performance thereof

10. Internal Checks and Audits

Providing all internal checks and audits necessary to insure the accuracy of the above records and reports

C. Organization

The controller will have direct executive control of the General Office and Division units responsible for the above functions, and indirect functional control of all other units responsible for such functions.

It will be seen from the foregoing General Order that the controller of this company is held responsible for the functions of both auditing and controllership. In this particular case an assistant controller performs the duties ordinarily performed by the auditor.

317. Relation of controller to auditing organization

In connection with the accounting department, the controller directs while the auditor performs. In pursuance of this policy the controller either outlines the classification of accounts and the supporting records which the company is to use, or approves those which have been prepared by the auditor. The auditor is responsible, however, for the maintenance of these accounts and records after they have been authorized. The extent to which the controller exercises supervision over the work of the auditor depends upon the size of the corporation and the extent of the duties of the controller.

What the auditor is responsible for—The auditor is responsible for working out all the details of the accounting. In the performance of this work he is compelled to delegate a considerable part of his duties to subordinates. This is necessary and desirable in order that he may have more freedom and thus have an opportunity to do more constructive work.

The auditor is responsible for the preparation of all the reports prepared from the accounting records. The controller may prescribe what these reports shall be and the form in which they are to be prepared, but the auditor is responsible for their preparation. This includes all the reports which go to the various executives, as well as those which go to the board of directors. Usually the auditor submits these reports to the controller for his approval before they are distributed. In some cases the controller maintains a record of all the reports to be prepared and of the parties who are to receive each report. In this case after the reports have been approved by the controller, they are distributed by his office. This affords a central control of the distribution of reports.

What the controller is responsible for—The controller is responsible for the interpretation of the accounting reports, and he should study them as a basis for offering recommendations to the other executive officers. In case of variations from the normal in the operations of the business, the controller should prepare an explanation of these variations, and should either submit his explanation along with the report or reports concerned, or transmit it as early as possible thereafter. The other executive officials should have the privilege of requesting from the controller such further information as they may need in interpreting the reports.

The controller maintains files of all reports and of all correspondence concerning the meaning of accounts and accounting reports and is responsible for issuing orders covering methods and procedure in the accounting department. A file of such orders is maintained by the controller to serve as official authority for the methods employed.

318. Staff of the controller

The controller usually has a staff under his immediate control to assist him in the performance of his functions. The size of this staff and the functions which it performs are determined by the size of the business and the nature of the control which the controller exercises. If a system of budgetary control is maintained, it will be necessary for the controller to have a statistical staff to compile the original estimates, to summarize the monthly reports in connection with them, and to show the comparisons between the estimates and the results. In the case of a complete system of budgetary control, this is a task of considerable magnitude.

In some cases, the controller has assistants who aid in the interpretation of reports and in the preparation of comments thereon. He may have certain assistants who devote their time to a study of methods and to the preparation of orders putting into effect any changes in methods which have been decided upon. Occasionally such work is carried on by a methods bureau which not only recommends the adoption of new methods, but supervises their installation after they are authorized.

That he may obtain a correlation of functions in addition to the staff which is directly responsible to him, the controller has functional representatives through whom he works in other departments of the business. In some cases these representatives may be responsible directly to the controller, while in other cases they may be answerable to the line executive in the department in which they are employed; but, in any case, they must co-operate with the controller in order that effective control may be exercised. As illustrations of such functional representatives of the controller, the following may be

mentioned: sales and publicity controller; operating and production controller; buying and merchandise controller; and credit officer as credit controller.

The sales and publicity controller is responsible for the following:

1. Supervision of the collection of statistical data with reference to sales and the preparation of reports to show how effectively the sales program is being executed
2. Supervision of the sales expense budget and the preparation of reports in connection therewith
3. Supervision of the advertising expense budget and the preparation of reports which will make possible its control

It will also be the duty of the sales and publicity controller to present the statistical data which will serve as a basis for the preparation of these budgets.

The operating and production controller is responsible for the following:

1. Collection and interpretation of data which will serve as a basis for making plans for more efficient operating methods
2. Preparation of data for the production budget
3. Supervision of the execution of the production budget and the preparation of reports which will make possible comparisons of production with estimated production

The buying and merchandise controller performs a function in the mercantile establishment quite similar to that exercised by the operating and production controller in the case of the manufacturing establishment. Some of his most important duties are:

1. Preparation of data which will serve as a basis for the preparation of the buying budget
2. Supervision of the buying budget and the preparation of reports which will make possible control of this budget
3. Supervision of merchandise stocks with the purpose of keeping them to the lowest minimum consistent with meeting sales demands (In the case of an establishment carrying large stocks, this is a task of considerable magnitude and of great importance.)

The credit manager is usually not answerable directly to the controller, but these two officials must work in co-operation in order to obtain proper control of the credit of the firm. Both the establishment and the enforcement of such limitations are dependent largely on the information provided by the accounting records. Moreover the credit plans and possibilities must be considered as an important factor in the formulation of the general budgetary plans of the business. The possibilities in the way of credit that may be obtained and credit that may be granted affects the sales and financial plans to a decided degree. Consequently the credit manager must work in co-operation with the controller in the formulation of the credit budget and in the exercise of control over this budget after it is prepared.

319. Representatives of controller not executives

It is not intended to imply by the above discussion that these functional representatives of the controller all act in an executive capacity in the departments in which they supervise the operations performed. They act in the capacity of a supervisor and adviser. They present information which will serve as a basis of plans and then present information which makes possible executive con-

trol of these plans. The line executives exercise the control, but the controller or his representative makes it possible for this control to be exercised in a rational way. In many businesses there are no individuals bearing the titles suggested by the preceding discussion. The duties ascribed to these representatives of the controller may be performed by his assistants or by assistants of the departmental executives. The primary purpose of the present discussion is to emphasize the necessity for the performance of these functions and their correlation with those of the controller.

320. Controller's use of advisory officers

The controller is brought into intimate contact with every phase of the activities of the business. It is his function to present and to interpret data which will serve as a basis for control of all the different departmental activities of the business. In the performance of this task, he will necessarily be forced to deal with technical matters with which he cannot be expected to be familiar; consequently, it will be necessary for him to consult other officers of the corporation in order to obtain the technical information which he needs. In order to indicate the possibility of the co-operation of the controller and such advisory officers a few illustrations will be given.

Many large corporations employ an attorney who devotes his full time to the service of the corporation. Smaller corporations retain attorneys to serve as counsel when needed. In either case the controller should have the privilege of consulting such counsel on legal matters pertaining to the corporation. Questions relating to taxation, reorganization, increase of stock, or bonded debt are illustrations of those which it may be desirable to

submit to legal counsel. Since the accounting records reflect all the operations of the business, all legal questions involving the business are of importance to the controller, and to his staff.

On questions of maintenance and equipment, engineers should be consulted. The service of the engineer and the service of the controller should supplement each other. In connection with production costs and production methods, the efficiency engineer should be consulted. Just as the mechanical engineer may be of service in giving advice about plant and equipment cost and maintenance, so may the efficiency engineer be of service in advising relative to the most efficient methods of using the plant and equipment. His service and advice should be available to the controller both in making plans and in judging the efficiency with which these plans are executed.

The officers in charge of buying and of merchandise stock can render valuable assistance in the preparation of the buying budget and in exercising control of merchandise stock. Only by a proper consideration of market conditions, as reflected in the reports of the officers engaged in the merchandise operations, can the controller make rational plans with reference to purchases of stock, or properly interpret the results obtained in the execution of these plans.

In the same manner in which the controller must consult the buying officer concerning purchases and stock control, he must consult the sales officers on sales control. All sales plans and policies must be made in consideration of market conditions; such conditions can be ascertained most easily and accurately from those who are engaged in mercantile operations.

Finally the controller should consult the auditor with reference to accounting details and should instruct him concerning the interpretation of accounts and subsidiary statements and reports with which he is not familiar.

Thus the controller, if he properly performs his function, acts as a means of assembling data with reference to all the activities of the business, analyzing, classifying, and presenting this data, and finally recommending methods of procedure based on the proper interpretation of this data.

Chapter XXXIV

Reorganization

321. Reorganization and financial management

This discussion has treated of the most important problems involved in financial management, since those who are interested in financial problems are concerned primarily with financing the organization and operation of a business. Unfortunately, not all businesses which are organized prove successful. The time may come when a business may not earn a profit and may even be unable to meet its obligations. Under such circumstances new problems of financial management arise. A refinancing or a reorganization of the business must take place, and certain problems are involved in this particular phase of financial management. It is necessary, therefore, that some consideration be given to the financial problems which arise under such circumstances.

322. Meaning of reorganization

Reorganization is the readjustment of the relations of the business to its stockholders and creditors. Usually it consists of the rehabilitation of an insolvent business through the adoption of a new financial plan. The term is loosely applied to various forms of consolidations, new incorporations, and similar arrangements. The term will be used broadly in this discussion to include any changes in the financial plan which are made necessary by the inability of the corporation to continue as an income-producing enterprise on the old basis.

Reorganization is of frequent occurrence. It occurs more frequently in the case of public service corporations, but it is by no means uncommon in the case of industrial corporations. When a corporation finds itself in such a position that it can no longer carry on its operations at a profit, it usually deems it expedient to follow a new plan in the hope that by this method it may be placed upon a paying basis. Under such circumstances there are two general alternatives to those interested in the financial condition of the business. The shareholders and creditors may demand that the property be sold outright, in which case very little is apt to be realized; or they may inaugurate a change of financial policy, and thereby attempt to put the enterprise on a more favorable working basis.

The extent to which the reorganization may be carried varies widely. The corporation may be permitted by shareholders and creditors to carry on its operations after some rearrangement of its obligations has been effected. This rearrangement may make possible the raising of capital for the desired purposes. This usually involves some adjustment of claims and possibly the issuance of new stocks or bonds. If such an arrangement cannot be made, or is not satisfactory to the shareholders and creditors, a total reorganization may be necessary. Under such circumstances the property of the corporation may be sold and may be purchased by a new corporation composed of former shareholders and creditors.

323. Purposes of reorganization

Reorganization takes place in order to put the corporation on an income-producing basis or to make it possible for it to meet its obligations. Although this is the

general purpose of the reorganization, the specific purpose or purposes which it may be desired to accomplish by the reorganization may be stated in more detail as follows:

1. To raise the additional capital necessary for the business to meet its obligations or to secure property or equipment necessary for it to carry on its operations
2. To reduce fixed charges so that there will not be such a large demand upon the income of the firm during periods of small earnings
3. To simplify the financial structure
4. To give increased facilities for raising capital in the future
5. To eliminate unprofitable branches or subsidiaries of the business
6. To pay or refund pressing obligations
7. To take care of an accumulation of unpaid, preferred dividends

The first purpose of reorganization is self-explanatory. The second may be necessitated by the fact that the business is developing rapidly; its income-producing capacity may be small for some time yet, and the interest payable on outstanding bonds or other indebtedness might prove embarrassing. Under such circumstances the corporation may wish to exchange stock for these obligations, since dividends on stock may be postponed, while interest on bonds cannot be postponed.

Under the third purpose stated the corporation, by a refunding or refinancing process, may replace the various obligations or kinds of stock by one or two issues. Such a plan makes for more effective co-operation on the part of the stockholders or creditors.

In the fourth place, reorganization will facilitate caring for expansion of the business by preventing any rela-

tions between the corporation and the shareholders or creditors which might prohibit the corporation's additional capital.

During the development of the business unprofitable branches or subsidiaries may have been acquired, to get rid of which a reorganization is deemed necessary.

The sixth purpose of reorganization can be illustrated by the issuing and exchange of other obligations, such as stocks or bonds, for obligations matured, but which the corporation is unable to meet otherwise.

The last named purpose is to provide some plan whereby stockholders may acquire some form of stocks or bonds in payment of the unpaid dividends.

There are doubtless other purposes for which reorganizations may be effected, but the above are sufficient to indicate the possibilities of such a procedure.

324. Causes of reorganization

The causes of reorganization are indicated to a considerable degree by the discussion of the purposes of reorganization. A study of these purposes will show that the principal cause of reorganization is the lack of capital. The business has insufficient capital to meet either its present or its future financial requirements, and a reorganization is necessary to obtain this capital. Such a lack of capital may arise from a number of causes:

1. The corporation may have had insufficient capital at the time of its organization. Underestimation of original capital needs and the failure to secure an adequate amount of working capital soon produce a need for additional capital, and often the firm must resort to reorganization to obtain the additional capital.
2. The business may have suffered losses resulting in such an impairment of capital that it can no longer meet its obligations.

3. Adequate provision for the replacing of capital which has become obsolete or depreciated may not have been made. The business may have made adequate profits but these may have been withdrawn in the payment of large dividends, as a result inadequate provision may have been made for maintenance of the plant and equipment and the replacement of such plant and equipment.
4. Accidental or unforeseen contingencies may arise which cause a destruction of the property of the business or create a demand for a considerable addition.
5. The managers of the business may have directed the business improperly and dishonestly, and, as a consequence, the concern may have become insolvent.

325. Methods of procedure

When the company finds that it is unable to continue under the present financial plan, it must decide upon the method of procedure to be followed in reorganizing. There are three things which it may do:

1. It may wind up its business, pay off its liabilities, and dissolve. This procedure is possible where the corporation is not producing a satisfactory income but has sufficient assets to pay its liabilities. If its liabilities exceed its assets, this method is usually possible only with the permission of the creditors. Usually this method entails great loss, since there are usually assets which are of value only to the going concern.

2. It may avail itself of the privilege of the Bankruptcy Act and, by proper legal procedure, be discharged of its obligations. There are some advantages and some disadvantages in this method of procedure; these will be explained presently.

3. It may secure the appointment of a receiver who will conduct the affairs of the corporation until a plan of reorganization can be worked out and put into execution.

326. Bankruptcy vs. receivership

From the viewpoint of the creditors, it is usually desirable to have a receiver appointed and a reorganization effected. This is especially true in the case of the preferred or secured creditors, since they are in an advantageous position and can force the stockholders and unsecured creditors to bear the expense and loss incurred in the process of reorganization. They can provide for the protection of their interests and are apt to realize more in the long run than if there were a foreclosure with the consequent loss arising therefrom.

On the other hand, the stockholders may find it more advantageous to permit bankruptcy proceedings and to purchase the property at the foreclosure sale of it. By this method they obtain the property free of debts and encumbrances, and are, therefore, able to hold it without the embarrassing influences of the creditors. Usually the business can be purchased for much less than its value and the amount they pay may be much less in proportion to the interest which they get than the amount which they will have to advance in order to carry out the reorganization under a receiver.

Bankruptcy injures goodwill and credit standing, and it may take years to overcome this ill effect. In addition, reputable business men take pride in the payment of their debts and look with disfavor upon taking advantage of the bankruptcy privilege. This plan also necessitates that the stockholders have sufficient funds with which to purchase the business, and to carry on its operations on a proper scale after its purchase. Unless the stockholders have sufficient working capital, another failure will result shortly. Large businesses resort to a receivership in most cases.

327. The receiver and his duties

The receiver is appointed by a court and is an officer of the court. He may be appointed by either a Federal or a State court. Where the property is located in a number of states, such as railroad property, it is more desirable that the receivers be appointed by the Federal Court, for a receiver appointed by a State court has no jurisdiction over property situated outside the state.

The appointment of a receiver is secured by a petition. This petition calls for the proper management of the property of a corporation until the differences between creditors and shareholders and the corporation are settled. The petition may be filed by any of the persons having claims against the corporation: stockholders, secured creditors, unsecured creditors, or the corporation itself. Among these, the secured creditor has the best claim in the eyes of the law, chiefly because he has the greatest rights and because he does not have a more desirable remedy.

As soon as a receiver has been appointed, the management of the property, which has theretofore been in the hands of the corporate managers, is turned over to the court appointing the receiver, and to which the latter is directly responsible. Since the property is now in the hands of the court, it is ordinarily not possible to enforce legal claims against it unless by permission of the court. The receiver gets an order from the court directing him to perform the following functions:

1. To take possession of the corporate property; to keep it in condition, and to operate it to the best advantage
2. To accept the income of the concern and to expend it to cover operating expenses as the court directs
3. To collect all money due the company

In the carrying out of these instructions the receiver has the implied power to do those things which are necessary to accomplish the orders of the court.

328. Committees

When a receivership takes place, it is customary for committees to be formed to look after the interests of the various classes affected. There may be a committee for each class of stockholders and for each class of creditors. These committees are frequently self-appointed. Then a few of the members of each of these committees will organize themselves into a sort of inner committee and appeal to the remaining members of the class to deposit their stock or bonds or to assign their claims to a designated trustee and to grant to this inner committee the privilege of control of their rights. If the appeal of this committee is successful and the committee succeeds in obtaining control of the interests of practically all of the members, it can then bargain with similar committees from the other classes. The organization of these inner committees is a necessity, because it is impossible for all the members of the various classes to get together.

If a reorganization is decided upon, these various inner committees select representatives to constitute a central or reorganization committee which works out a plan of reorganization to be submitted to the various subordinate committees and, if approved by them, to the parties in interest. Usually the individual members of the different groups are not consulted directly. The plan approved by the committees is submitted to them, and they are urged to take the necessary steps to carry out the organization plan. This may necessitate the changing of the form of the obligations which the company owes

them, and it may mean the reduction of the amount of the obligations or, in the case of the stockholders, it may require the payment of an assessment. The stockholders and creditors do not have to acquiesce in the plan, if they do not wish to do so. If they do not agree to the plan, then it will be necessary for the company to satisfy their claims in some other manner. Of course, if the required number of stockholders approve the plan, the remaining stockholders may have to accept the reorganization conditions or lose their interests entirely. Stockholders and creditors may cause difficulty by going into court and asking for an injunction against the execution of the plan; but such an injunction will be granted only when it can be shown that those who are responsible for the reorganization plans are acting illegally or in bad faith.

329. Financial plan of reorganization

One of the most important problems to be solved by the reorganization committee is the financial plan to be followed. In deciding upon this plan, it must bear in mind that the most important objects of the reorganization usually are:

1. Reduction of the floating debt
2. Providing for working capital and for the means of obtaining future capital
3. Providing for funds with which to improve the property and to place it in an efficient operating condition
4. Reduction of the fixed charges so that they will be well within the earning capacity of the business

In order to accomplish these objects, two things are necessary: (1) Additional capital must be secured; and (2) the financial plan must be changed so that the fixed charges will be reduced.

330. Raising of funds

The reorganization committee may secure funds by issuing new securities, by assessments, and by long-time securities.

By issuing new securities—The usual condition of a corporation which has become insolvent makes it impossible or impracticable, as a rule, to issue new securities. This means of raising funds is usually exhausted before the concern reaches a state of insolvency. If it is deemed inadvisable to issue additional stocks and bonds, it may be possible to obtain money by the use of receiver's certificates. A receiver's certificate is, in effect, a short-term note secured by a first mortgage upon all the property in the receiver's hands. Money obtained by this method may be used for the payment of urgent claims; or it may be used for the upkeep of the corporation property. This is a legitimate means of raising money, because, even though the lien of these certificates comes before that of a first mortgage, it serves as a means towards the realization of creditors' claims.

If it should be decided that new securities are to be issued, a financial statement for the Securities and Exchange Commission has to be prepared in order to admit the new securities to the trade on the respective Stock Exchange.

By assessments—It is not uncommon in reorganizations to call upon security holders to pay assessments. There is a choice for the holder, however. He may pay his assessment or sell his interest in the organization. Every inducement is made to him to make payment, because the corporation does not want him to dispose of his stock in the open market. The assessment method is not highly favored because it compels the holder of

securities to pay in additional money in order to hold his present interest.

By long-time securities—It is sometimes possible to induce creditors to accept long-time securities in lieu of present settlement of the debts of the corporation. By this method the floating indebtedness of the business is decreased, but the fixed charges are apt to be increased.

331. Reduction of fixed charges

One of the most frequent reasons for the insolvency of business is that the fixed charges are too large in proportion to its earning capacity. One of the most important tasks of the reorganization committee is to devise a financial plan which will reduce the fixed charges so that their amount and nature will be such as is approved by principles of sound financing. Mr. Daggett in his text on "Railroad Reorganizations" states these principles as follows:

1. The maximum fixed charges after the reorganization is completed should not exceed the absolute minimum of net earnings.
2. As large a proportion as possible of the charges should consist of interest on bonds, avoiding sinking funds, guaranteed dividends, rental, and the like.
3. The losses should fall most heavily on the junior security holders generally, leaving the first lien securities—unless the reorganization is exceedingly drastic—practically untouched.
4. While fixed charges should be cut, the nominal value of the new securities received by security holders in the old company should be reduced as little as possible.
5. Bondholders whose claims are scaled down should be given a corresponding chance to participate in future increases of earnings.

332. Summary

Only a few of the more important problems involved in reorganizations and only a few of the methods of solving these problems have been presented in the present discussion. The reader who is interested in this problem can find more complete discussions of this subject in the various texts on corporation finance.

Chapter XXXV

Financial Abuses

333. Need for consideration

Unfortunately, not all of the officers and shareholders of a corporation act with such single-minded purpose and direction as to secure the prosperity and financial prestige of the corporation. History shows that instances are much too frequent where they have used their position to further their individual interests at the expense of the business which they are supposed to serve. It is deemed desirable, therefore, to discuss briefly some of the "financial abuses" to which a corporation may be subjected to the end that those interested in the financial administration of a business may be able to prevent such abuses or to detect them should they occur.

334. Nature of financial abuses

The financial abuses to which a corporation may be subjected may be brought about by a variety of practices. These practices may be classified broadly under two heads: fraud and exploitation. It is often hard to determine whether any particular act is fraud or exploitation. Fraud implies an intent to deceive and to cause injury. It is often very difficult to prove the intent. Exploitation may result in as great injury, but it may not have been brought about by means of deception and there may not have been an intent to cause an injury. In many cases, however, the intent to cause injury may be presumed to exist, since injury is the necessary consequence of acts performed. It is important to make a distinction between

fraud and exploitation; for in the case of fraud, there is legal redress, while in the exploitation there usually is no redress.

As it is difficult to distinguish between fraud and exploitation, so it is difficult to distinguish between exploitation and "business shrewdness." It is difficult to determine just how far an officer, director, or shareholder may go in seeking his financial preferment and yet not violate the good faith which he owes the corporation. The legal fiction that a corporation is a separate entity tends to increase this difficulty. The officers and shareholders feel that they are separate and distinct from the corporation, and this feeling tends to obscure the relationship of trust which should exist between them and the corporation.

In order to show more clearly the methods by which exploitation may be effected, it is necessary to discuss the abuses which may be practiced by the officers, by the directors, and by the stockholders. Although it is deemed desirable to discuss separately the abuses which may be practiced by the three groups it will be seen that the activities of these groups are so closely related that in some cases such a separation is not feasible. In other words, it will be found that in some cases, officers, directors, and shareholders may combine to bring about exploitation. The purpose of such action is usually to benefit the majority stockholders at the expense of the minority interests.

335. Abuses by officers

Salaries—One of the most frequent methods of exploitation on the part of officers is to absorb the profits of the firm by means of large salaries and thus leave

only small profits to be distributed to the stockholders. This happens most frequently when the officers are both stockholders and directors. By this method the officers benefit at the expense of the remainder of the stockholders. The by-laws usually authorize the board of directors to fix the salaries of the corporate officers. If the officers control the board of directors and, by this means, increase their own salaries, it is difficult for the stockholders to obtain relief. If the officers do not control a majority of the stock, the stockholders can throw out the present directorate and choose another one which will follow its wishes by decreasing the salaries. The larger the corporation and the higher the number of shareholders (the latter frequently distributed over a wide area), the more difficult will it be to take effective action against a board of directors. If the officers hold a controlling interest of the stock, there is little that the minor interests can do. If the minority can show bad faith on the part of the directors, they may obtain legal relief, but this must be clearly shown before the court will intervene, and bad faith is difficult to prove.

Contracts—Another means by which officers may benefit themselves at the expense of the corporation is in the letting of contracts. Officers who have the power of contract have considerable freedom in choosing the companies with which they deal. There are three ways by which officers may profit in the letting of contracts:

1. They may arrange with the company from which they are making the purchase to receive a commission on all goods purchased.
2. They may purchase the goods in their own name and then resell it to the corporation at a profit.

3. They may purchase from companies in which they are financially interested.

The officers of a company have information concerning the operations of the company which is usually not available to the stockholders. They may know that certain lines or certain commodities are very profitable, and that other lines are not.

It is possible, therefore, for such officers to organize another company which will handle the profitable lines only and obtain large profits from this company, while the original company may suffer greatly from the competition. While officers cannot be denied the privilege of leaving a company and organizing another company, it seems undesirable for them to organize a competing company while continuing their connection with the original company.

Using inside information—Officers might also use the inside information which they possess in regard to the corporation as a basis of speculation on the stock exchange. They know whether a dividend is to be declared. They might estimate the effect of the action of the board of directors relative to dividends on the stock and could govern their dealings accordingly. Officers of a corporation are in the position to anticipate, for instance, a period of financial stringency on the part of the corporation and would be able to speculate in its stock to the extent that its financial standing is affected and thereby its financial condition made worse. This very dangerous form of abuse has recently been checked by Federal legislation. According to the provisions of the Securities Exchange Act of 1934, all officers and directors of a corporation whose shares are listed on an exchange, must report all changes in their ownership of shares of that corpora-

tion, if they own more than 10 per cent of any class of securities of that corporation.

336. Abuses by directors

The abuses we have just considered are not confined to the officers of a corporation. Unfortunately it is not uncommon for the directors to have a hand in the exploitation. They may be in a better position to carry on financial abuses than are the officers. The abuse in connection with the question of salaries is not so extensive with directors as with the officers, although they are often directly responsible for the sudden increase in officers' salaries; and often the directors and the officers are the same parties. As a rule, provision is found in the by-laws of the corporation covering the question of fees for the directors. If this be the case, they are justified in accepting the amount prescribed them and there can be no objection on the part of creditors or shareholders. There is then little chance for the directors to enrich themselves in this way.

Contracts—Contract abuses may be traceable to the directors as well as to the officers. Their principal methods "may take the form of unfair contracts with a corporation, or of sales at exorbitant prices, or of misstatements of fact, thus misleading some of the outsiders into buying or selling at far above or below fair valuations, or of misusing the resources of the corporation to assist in outside ventures or speculations." The contractual abuses may be practiced by directors as well as by officers, and the possibility of punishing them is still very remote. Directors are in a position to exercise their powers in whatever way they see fit without much interference from shareholders or the courts. The only satis-

faction that the former receives is through voting to change the personnel of the board of directors. He does not receive much consideration from the courts, because the directors are deemed to be performing their functions properly unless the contrary is proved, and the shareholder will find considerable difficulty should he attempt legal proof of improper performance of duties on the part of the directors.

It is also possible for directors to exercise their influence in the formation of other companies. The possibility is open to them, as to officers, to organize a new and competing company in profit-making lines, at the expense of the original corporation. In this way they are making use of inside information with reference to the corporation and its possibilities of extension much to the detriment of the primary organization. When directors participate in the formation of a competing company it is desirable that they withdraw as directors of the original company.

Overstating profits—The director may manipulate the accounts of the corporation in such a manner that the shareholders will be misled, and the directors be benefited thereby. This may be accomplished in a great many ways. Directors may juggle the valuations upon the merchandise or other property of the corporation, in order to create a favorable impression. They may omit liabilities from the balance sheet, and expenses from the statement of profit and loss. By these means the profits of the business are overstated and large dividends may be declared. These dividends will influence the price of the stock and will enable the directors to unload large holdings purchased at a low price. The only way such a procedure can be discovered or prevented is by a critical examination

of the books of the corporation by professional accountants. Federal legislation, especially through the Securities Exchange Act of 1934, has successfully begun to combat these abuses. Corporations desiring to have their securities registered on an exchange, are subject to the regulation of the Securities and Exchange Commission. The latter requires registration statements to be filed in order to assure to the public a maximum of reliable information. The Commission, furthermore, prohibits the manipulation of security prices and subjects the pegging of quotations to regulation.

Public accountants who have their professional status at stake are also likely to present the true condition of the corporation. The shareholders can obtain greater satisfaction if they, on their own account, choose a reputable accountant and make the necessary arrangements for him to examine the financial affairs of the company.

Understating profits—In some cases it may serve the purposes of the directors to impair the financial standing of the company and to understate the profits. To this end they may cause the company to incur losses and force it into bankruptcy. A corporation can readily be forced into bankruptcy in many different ways at the instigation of the directors. A favorite method is to use the profits for improvement of the property or similar purposes and fail to pay interest due on securities. When the corporation is thus forced into bankruptcy, it is possible for the interested directors to be instrumental in the formation of a new company to take over the interests of the defunct concern. The change, of course, is effected to the detriment of the stockholders. In order to obviate performances such as the above, the stockholders ought to realize how important it is that they retain control.

"A swindling or hostile board of directors can do more in one session to wreck a corporation and bring loss to its honest stockholders than a capable board can accomplish in years toward repairing the damage."

337. Abuses by stockholders

Cheating creditors—Abuses may be carried on by the stockholders of a concern with the end in view of depriving the creditors of that to which they are rightfully entitled, or with the end in view of "squeezing" the minority stockholders for the benefit of those who possess the majority interests. A favorite practice which is carried on at the expense of the creditors is one in which goods are purchased on credit and sold, and the funds misappropriated, followed by bankruptcy. A more common practice by the stockholders is to allow the assets, upon which money has been borrowed, to depreciate and deteriorate, and to make no provision for their replacement. In this way profits may be distributed to the shareholders, while the bondholders will have nothing more upon which to satisfy their claims than deteriorated assets. The only way this difficulty can be met is for the bondholders or creditors to satisfy themselves that the property is kept in condition, as good or better, than when the mortgage was placed.

Squeezing the minority stockholders—The majority stockholders are able to conduct the business to the detriment of the minority stockholders in a number of ways. One method which the majority stockholders may follow is to transfer the majority part of the product of the corporation to another corporation of which the majority stockholders own the stock, and to transfer it at such a price as to leave no profit to the first corporation while

affording a very large profit to the second corporation. Again, the majority stockholders may understate the earnings and withhold dividends, thus driving down the price of the stock and ultimately forcing the minority stockholders to dispose of their stock. The stock will then be purchased by the majority stockholders and they will declare a large dividend from the accumulated earnings. In this way they can drive the price of the stock up again to a point where they can sell at a good profit.

338. Methods of eliminating abuses

No doubt officers and directors are more frequently guilty of such abuses than are shareholders. It is somewhat difficult to eliminate such abuses under the present legal conditions. Many of the acts of the officers and directors are not subject to critical supervision and are not being checked up carefully. Aside from demanding still more adequate legislative protection, the following methods may be employed to check such abuses:

1. Exercise, by stockholders, of more care and judgment in the selection of directors.
2. Greater publicity in regard to the operations of the corporation and to the result of these operations so that the stockholders may have information which will enable them to detect improper actions on the part of officers and directors.
3. Provisions in the by-laws governing the amount of the salaries and fees of the officers and directors.
4. Arrangements for cumulative voting so that the minority stockholders, by combining their votes, may secure representation on the board and thus have their interests looked after.
5. More interest manifested by the stockholders in the affairs of the corporation and a more active participation in the conduct of its affairs.

PRACTICAL STATISTICS

CHAPTER I

PLACE OF STATISTICS IN BUSINESS

Definition of Statistics. When we use the term "statistics," we may be referring to either one of two things. First, if we are speaking of statistics as a subject—a field of knowledge and study—we may define it, as does Webster's Collegiate Dictionary, as "the systematic compilation, analysis, and presentation of facts for the purpose of making general inferences, of drawing general conclusions." Second, we may refer to the classified facts themselves, generally expressed in numbers, concerning some particular matter or concern, which are also called statistics. It is in this latter sense that the Office of Internal Revenue has named one of its annual publications "Statistics of Income," because this publication contains facts concerning the incomes of individuals and corporations in the United States during a given year. Another example is the "Statistical Abstract of the United States."

If we agree, as we must, that statistics is both a method of accumulating, analyzing, and presenting numerical facts, and also these facts themselves, we realize what a tremendously broad field statistics covers. Wherever there are numbers, there are statistics. When we say that Ole Olson and Mike Murphy are each forty years old, we are uttering statistics. When the crossroads storekeeper keeps his simple set of books, he is dealing with one sort of statistics and employing a statistical method, although we call it by the more familiar term of "accounting." When the manufacturer has kept such records that he can determine the per-unit cost of any product which he manufactures, this system and these facts are statistics, despite the fact that we call the method "cost accounting" and the facts "cost figures."

Although the foregoing definition of statistics is perfectly correct, common usage, at least so far as business is concerned, has made a

distinction between accounting and statistics somewhat as follows: Accounting concerns itself with the internal affairs of an enterprise, expressed, usually, in terms of money, and recorded in a double-entry set of books; while statistics is a study of facts outside of the individual business. Statistics may also include non-monetary facts concerning the internal affairs of a business and the analysis and summarization of monetary facts in a non-double-entry fashion. This distinction is not definite, because the two fields overlap somewhat, but it is of some help in limiting this discussion to what is generally recognized as "business statistics."

General Need for Accurate Information. Now that we are agreed on a definition of statistics, we must determine what purpose statistics can serve in business. The general answer is clear. In these days of increased efficiency and broad markets, when profit margins are small, the need for accurate information as a basis for business decisions is greater than ever before. No longer can the business man afford to use rule-of-thumb methods in solving problems; such irrational procedures have given way to intelligent analyses of all pertinent facts. It is the purpose of statistics to collect those facts, to discover their meaning, and to present them in a readily understandable manner. On the basis of this presentation, the business man can decide to act or to "sit tight," to investigate further or to discontinue negotiations. Factual knowledge does not eliminate the necessity for decisions, because there is always room for personal judgment; but such knowledge does furnish a sound basis for the exercise of personal judgment.

1. In Manufacturing. It is difficult to think of a single decision which the manufacturer must make, from the time when he first considers manufacturing, which is not dependent to some degree upon statistical knowledge. "What products shall I manufacture? How many products? In what price class? Where shall I build my plant? When shall I build? Of what shall I build? For what railroad facilities shall I arrange?" These are some of the problems which must be decided before manufacturing is ever commenced; and in the making of such decisions, statistical analyses are invaluable.

"How many units shall I manufacture next month? Shall I re-

place this machine? If so, with what type of machine? What men shall I lay off if it is necessary to cut the force? How can I lower my costs? Will it be safe to expand operations? Shall I buy my raw materials as they are needed by the production department, keeping very small stores, or shall I try to anticipate market changes?" Such questions arise from day to day; and upon their correct solution depends the success of the business. Again, internal and external statistics furnish factual bases for these decisions.

2. In Marketing. Accurate statistical information is just as necessary for making intelligent decisions in the field of marketing. The two primary questions to be answered are: "What can be sold, and where? How can we sell at the greatest profit?" An analysis of markets—considering population, wealth, buying habits, competitors in the field, and shipping costs—will assist in answering the first question. The second problem requires an evaluation of different pricing policies, of different channels of distribution, of different types of sales organizations, of different methods of sales promotion, of individual salesmen in the field, of alternative methods of compensating salesmen, and of different methods of setting sales quotas. Statistical data are necessary for determining these major policies, as well as in making detailed decisions.

3. In Banking. The banker also has need of statistics in deciding such matters as these: "Will this loan be self-liquidating? Can I afford to expand my loans, or would it be wiser to contract them? Are my reserves sufficient? What is the probability of a panic?" The bank is a focal point toward which converge all of the forces operative in the business community. Therefore, the banker, if he is to know his own business, must know everyone else's business as well. The big metropolitan banks and the Federal Reserve Banks are some of the most important collectors and dispensers of business information. The task of a central bank is increased many fold when it assumes partial responsibility for the maintenance of the price level, as most central banks have done of late.

4. In Investment. Statistical information is needed not only by men actively engaged in business and banking, but by the private investors as well, if they are to select securities which are both safe

and likely to increase in price. As a corollary, the investment banker, who determines what securities shall be offered to investors, must be able to pass on the soundness of each issue. He must understand both present and prospective conditions, not only in the financial markets but in all fields of business. His information may be partly general, but he must also make a detailed study of the individual enterprise the securities of which he is planning to underwrite, considering both its internal conditions and its position in the industry. Clearly, this is a big task and calls for a vast amount of well-digested information.

Forecasting Business Conditions. Underlying the preceding discussions of the place of statistics in various types of business, you have no doubt detected this common thread: A large percentage of business decisions rest upon a forecast of future events. "Are prices going up or down? Are sales going to increase or decrease? Will new inventions affect markets?" Since time is an important factor in business transactions, individuals must not only know what present conditions are, but must also predict what conditions will be tomorrow, next week, next month, and next year.

To predict correctly and to act on such predictions means increased profits. To predict wrongly means losses. It is impossible to refuse to predict at all, since a failure to take either a "bullish" or a "bearish" position is, essentially, to say that there will be no change, which is in itself a prediction. Both governmental and private agencies collect data upon which to base forecasts, and there are several private forecasting services to which one may subscribe.

Necessary Techniques. Now that we see how we can use statistics in their finished form, how do they reach that finished form? In order to answer this question, we shall discuss the collection of data, their tabulation and graphic presentation, various characteristics of frequency distributions, and time series.

CHAPTER II

COLLECTING AND TABULATING DATA

Defining the Problem. It may seem too obvious to be worthy of mention that the first step in any statistical study is to define the problem which we wish to solve. Often, however, a problem is stated in terms which are too general, and we must decide more definitely just what we want to find out before we can determine what facts we shall need. For instance, if we want to ascertain the income of the inhabitants of a certain county, we must decide whether we mean the total money income of those whose legal residences are in the county, or their money income which originates within the county, or their money income from all sources plus imputed income due to garden products which are consumed at home, imputed rent on owned buildings, etc. (Imputed income is income not realized in cash or trade but due to the *use* of owned goods or realty.)

Surveying Existing Information. Once we have answered such questions as these and have defined the problem, the next logical step is to see if any of the facts which we want have been collected by someone else, so that we may avoid the expense of gathering them ourselves. As a matter of fact, the greater part of all statistical work consists merely of working over data which are already available in some general and perhaps unorganized form. After launching our investigation, we may discover that our original objective is impractical, due, perhaps, to the high cost of securing the necessary information and to the inability to arrive at results which are worth the cost involved. In such a case, we should either drop our investigation or alter its objectives so that the findings will be valuable enough to make the cost, from that point on, warranted. In other words, we must question intelligently everything that we do, rather than formulate a plan and then carry it through with our eyes closed to any weaknesses and omissions.

Selecting the Units. Not only must we define our problem, but we must also define the statistical units to be used. Many statistical units are rather easily defined, but often they must be qualified. For instance, if we were counting the retail stores in a given area, should we include filling stations? watch repair shops? shoe repair shops? custom tailors? door-to-door canvassers? garages? When we use the unit "quart," do we mean dry measure or fluid measure? If we are measuring the output of bakeries by loaves, do we mean one-pound loaves, three-fourth-pound loaves, one-and-one-fourth-pound loaves, or some other size? All units should be definitely decided upon in advance.

Units Must Be Homogeneous (Alike). If we are to reach valid conclusions as a result of our investigation, our data must be uniform. We cannot compare prices of No. 2 corn in one market with prices of No. 4 corn in another market, without some adjustment. If we are tracing the value, from year to year, of an investment in a certain stock, we must allow for all cash dividends, stock dividends, stock split-ups, and "rights," rather than compare only the market prices of one share of stock from time to time. For instance, after a 100 per cent stock dividend, the investor has twice as many shares as before, so the market price per share must be multiplied by two to make it comparable with the per-share price before the additional stock was issued.

Sampling. If the universe of phenomena in which we are interested is fairly small, we may be able to investigate every case in the universe. This would be true of a study of the wages of laborers in a single manufacturing plant during a given year. Every worker and every week could be considered without the burden of statistical work becoming too great. However, if we were to launch a study of the retail prices of consumers' goods in the United States from year to year, it would be an impossibility, because of the magnitude of the task, to secure a price quotation on every article carried by every store throughout the country.

No business concern or governmental agency can afford to spend more money on an investigation than will be received as benefits therefrom by the individual concern or by the body politic. There

must be a constant balancing of marginal costs and marginal benefits, and therefore a device known as "sampling" is frequently used. The principle of sampling is this: If a fairly large sample is selected without bias from a universe of phenomena, the characteristics of the sample will differ but little from the characteristics of the universe as well as from those of a second large sample so chosen.

A good sample must meet two requirements: First, it should be fairly large; second, it should be unbiased. Expense is the governing consideration in determining the size of the sample; but cost should be balanced against the fact that the error of sampling is inversely proportional to the square root of the size of the sample—that is, the size of the sample must be quadrupled in order to double the accuracy of the result.

Random and Directed Sampling. Bias may be avoided either by methods of random (or simple) sampling, or by directed sampling. A brief illustration will make these two methods clear. Suppose a small feed mill wishes to make a study of the farm poultry flocks in a certain county, with a view to bringing out a new line of poultry feed in that area. The mill desires such information as the size of the flock, whether or not commercial feed is used, and, if so, what kind. The county is large, containing thirty-six townships, with about five thousand farms. The miller decides that it will not be necessary to collect information from every farmer, but that a sample of five hundred farms will do.

Suppose that he decides to use random sampling. He does not just write down the names of five hundred farmers who happen to come to mind, or who have done business with him in the past. Instead, he writes the name (or number) of each of the five thousand farmers on a cardboard disk, mixes the disks thoroughly in a barrel, and draws out five hundred of them. The resulting sample is said to be "random" because each farmer had an equal opportunity to be drawn.

If the miller were to decide to use a method of directed sampling, his procedure would be somewhat different. He would first classify the five thousand farms according to townships, or acreage, or on some other distinctive basis, decide upon the relative importance of

| | |
|-------------------------------------------------------------------------------------------------------|------------------|
| 1. What is your best-selling 5c cigar?..... | |
| 2. Why do you think this cigar sells the best? | |
| Quality | |
| Advertising..... | |
| Other reasons..... | |
| 3. What type of advertising do you think helps the most in selling 5c cigars? | |
| Radio..... | |
| Newspaper..... | |
| Magazine..... | |
| Billboard..... | |
| Other..... | |
| 4. What cigar do you smoke yourself?..... | |
| Interviewers—Be sure to get an answer for each of the above questions, filling in the blank yourself. | |
| Name of Person Interviewed. | |
| Name of Store..... | Interviewer..... |
| Address of Store..... | City..... |

Fig. 1. A questionnaire to be filled in by a personal interviewer in connection with a survey of cigar advertising. (Only Grade A cigar stores were included in the survey.)

each group, and then select the proper number of farmers from within each group by random, as explained above. For instance, if the first classification were by townships, the miller might decide to draw fourteen names from each township, making a total of five hundred and four farmers. If the size of the farms, and their number, varied greatly between townships, he might decide on some unequal and more logical distribution, such as one-tenth of the farms from each township.

In general, if the primary classification is logical and accurate, directed sampling is superior to the random method. However, most statistical measures of the accuracy of conclusions derived from a sample assume that the sample was a random one, and that is an added consideration in favor of random sampling.

Use of Enumerators. Once it has been decided who are to be asked for information, the next question concerns the best and cheapest method of securing this information from them. In a thickly populated area, and wherever it is imperative that answers be secured from all those selected or from a large percentage of them, a personal canvass by hired enumerators is the plan most generally used. This requires drawing up a form including all questions, unambiguously worded, and all necessary explanations, so that the enumerators will not have to make decisions and interpretations in the field, with resulting non-homogeneity of results. The questions should be as few as possible; should be answerable by a number, or by yes or no, if possible; and should include no unnecessary or too-personal questions. Fig. 1 shows a sample questionnaire of this type.

Before starting the actual survey, it is wise to fill in a sample blank with imaginary data, merely to make sure that the sequence of the questions is logical and easy to follow, and that their arrangement allows plenty of room for answers and facilitates computations. Where possible, the questionnaire should be "tested" by a few preliminary interviews before being put into general use. The enumerator should set down the answer to each question as soon as it is secured, rather than wait until the end of the interview. He should make no computations in the field, but should defer all such work until the questionnaires have reached the office.

Mail Questionnaires. Often the wide geographical dispersion of those from whom information is desired forbids the use of personal enumerators and necessitates mailing the questionnaires. Even more than in the case of question sheets filled in by personal interviewers, these mail questionnaires must be self-explanatory, with brief, unambiguous questions. The questions should be very few in number and of sufficient interest and importance to warrant the recipient in filling in the desired information and returning the questionnaire. See Fig. 2. Indeed, the chief objection to the use of mail questionnaires lies in the difficulty of securing the cooperation of those to whom the questionnaires are addressed. Sometimes the benefits to be derived from the survey are self-evident, as in the case of a survey conducted by a trade association among its own members. At other times, how-

THE WARREN COUNTY SHIPPING ASSOCIATION
Monmouth, Illinois

January 5, 1935

Mr. John Doe,
Roseville, Ill.

Dear Sir:

In connection with a nation-wide survey being conducted by the Department of Agriculture, we are asking your cooperation in answering the three questions at the bottom of this sheet. Your answers will be held strictly confidential, but we should appreciate your return of the questionnaire so that we may arrive at a correct total figure for the county.

Sincerely yours,
Warren County Shipping Ass'n
By.....

* * * * * * * *

1. How many sows did you have farrow between February 1 and July 1, 1934?
(Give exact number)

2. How many pigs from these sows did you raise to weaning?
.....
(Give exact number)

3. How many sows do you expect to have farrow between February 1 and July 1, 1935?.....

Fig. 2. A Mail Questionnaire

ever, some other incentive must be provided, such as the offer of an automatic pencil, a good-luck ring, or a paper knife to those who return the questionnaire properly filled out.

There are two important reasons why as large as possible a percentage of the questionnaires should be productive of results. In the first place, the expense of sending out questionnaires is wasted if they are not returned; second, and of more importance, is the fact that a process of selection goes on when only part of the questionnaires are returned—that is, the facts indicated by a survey wherein only 10 per cent of the questionnaires are answered and returned may be

quite different from the findings which would have resulted had every questionnaire been returned. It is very difficult to measure and allow for this type of bias, and its elimination through securing a nearly perfect response should be attempted in every survey conducted by mail.

Primary and Secondary Data. As has been suggested, it is often unnecessary to obtain data in the field, since many public and private agencies are constantly at work gathering facts on almost every conceivable subject, and these facts are made available either through periodic publications or upon request. Probably the Federal Government is the most important collector and dispenser of information: Some of its more important publications are the decennial "Census of the United States," the annual "Statistical Abstract of the United States," the Department of Agriculture's "Yearbook of Agriculture" and monthly "Crops and Markets," "The Biennial Census of Manufactures," the Bureau of Labor Statistics' "Monthly Labor Review," and the Department of Commerce's monthly "Survey of Current Business," with its weekly supplement.

The Federal Reserve Board issues the monthly "Federal Reserve Bulletin," and each of the twelve Federal Reserve Banks also has a monthly publication dealing more specifically with the state of industry, trade, and agriculture within its own district. Many private banks, large industrial enterprises, and trade associations publish periodic bulletins of general or special interest. In addition, there are many technical journals published by private publishers, and financial papers such as "The Annalist," "The Wall Street Journal," "Barron's," and "The Commercial and Financial Chronicle." Even the daily newspapers have financial sections which may contain information relating to the problem under investigation.

Data which are compiled as the result of an original investigation—that is, which are pursued back to their source and there ascertained—are called "primary data." Those which have already been prepared by someone else are termed "secondary data." Thus, if Jones discovers the age of every automobile in his township, the results are primary data so far as he is concerned, but secondary data to Smith, his neighbor. In general, primary data are more reliable than

secondary data, because errors may be made in copying and because explanations and qualifications are sometimes omitted from secondary data. Of course, revisions may be better than the original primary data, because faults may have been discovered and corrected. Sometimes the compiler of secondary data may check them more carefully than their original compiler, and hence increase their accuracy.

Drawing Up a Scheme of Classification. Once we have secured our information, the question arises as to how we are going to handle it, and how we should present it to those for whom it is intended. If there is very little of it, we may present it in narrative form, as: "Clinton Township contains thirty-six square miles and has a population of 1,179, while Sandwich Township, containing eighteen square miles, has 2,913 inhabitants." However, such a method is not appropriate where a large mass of information must be presented. In such a case, the facts are usually drawn up in tabular form.

The fundamental function of a table is to aid in the analysis of information, through classification. The classificatory scheme must be fairly well in mind before the survey is ever launched, but alterations may be made after the data have been collected. Items are grouped according to their common characteristics, and are arranged in the table in such a manner as to bring out the relationships between items and between groups.

Methods of Allocating Data to Classes. If a large mass of data has been collected, the process of sorting may be a laborious one. Once the classes have been decided upon (a problem discussed more fully later), individual items may be consigned to the proper classes by tallying, hand sorting, or machine sorting and tabulating. The first method is familiar to all of us, and consists in reading each item in turn and making a vertical mark or tally in the proper space on a tally sheet, see Fig. 3. This is generally done by one person reading and another tallying. Another method of classifying is to write each item on a card and then hand sort the cards into groups, much as mail is sorted in the post office.

Machine Tabulation. The third method, and the one generally used where there is a great deal of tabulating to be done, and where each information sheet or questionnaire contains several

different items of information, is to punch all of the data on punch cards of uniform size, containing 45 or 80 columns of digits. This punching is done by machine; then the cards are sorted as to each column of digits by another machine. Each column of digits has its own particular significance.

Fig. 4 shows a sample punch card used by a wholesaler. The column headings are largely self-explanatory. The punches on the

| SIZES OF GROCERY ORDERS | | |
|-------------------------|-------|-------|
| SIZE OF ORDER | TALLY | TOTAL |
| \$0.00-0.49 | | 3 |
| 0.50-0.99 | | 10 |
| 1.00-1.49 | | 17 |
| 1.50-1.99 | | 13 |
| 2.00-2.49 | | 23 |
| 2.50-2.99 | | 29 |
| 3.00-3.49 | | 12 |
| 3.50-3.99 | | 17 |
| 4.00-4.49 | | 7 |
| 4.50-4.99 | | 5 |
| 5.00-5.49 | | 2 |

Fig 3. Tally Sheet for Hand Compilation

card indicate that on July 21, 1927, salesman 16 made a \$600.00 sale to customer 45. Other punches indicate the invoice number, the class of trade, the location of the customer, the commodity, the unit in which the quantity is measured, the quantity, and the cost of the goods sold. It is evident that some form of coding must be used, since only numerical facts can be punched on the card. A separate sorting is required for each column of pertinent figures.

Form of the Table. Once the facts are classified, they are ready to be arranged in tables. Since there are many types of tables, the particular purpose to be served must be definitely decided upon. Per-

should be plainly defined, although this may be done for the table as a whole if the same unit is used throughout. Sometimes a simple caption is all that is needed; but often a more complicated arrangement is necessary, as when part of the caption is common to two or more columns. The precise relationship of each caption to the various columns should be made plain by the ruling of the table or, in the case of a typewritten table, by underlining. If a complete description of the contents of a column would be too lengthy to include in the caption, it may be continued in a footnote. In reality, a caption is nothing but a sort of subtitle; its length and completeness, therefore, may depend somewhat upon the length and completeness of the title.

Stubs. Just as the caption is the title of a vertical column, so the "stub" designates the contents of a horizontal "row." It must possess the same qualifications as a good caption.

The general form of the table, with its rulings and spacings, is very important. It is generally advisable to have more rows than columns. Items which are to be compared should be in the same column rather than in the same row, and columns of figures which are to be compared should be placed adjacent to each other. Crowding the columns together should be avoided. It generally facilitates reading to group the rows in groups of five or ten; or, in the case of months, in groups of three or six. These groups may be separated by lines or by spaces. The columns, too, may be separated by either lines or spaces. The relationships of different columns to each other may be made plainer by the use of spaces of different widths and rulings of different weights. In typewritten tables, spacing rather than ruling is generally used.

Arrangement of Items. There are many different methods of arranging the items in a table. Totals are generally shown at the bottom and in the right-hand column, although emphasis on the totals may be secured by placing them at the top of each column and to the left. Miscellaneous groups should always appear just above, or to the left of, the total, after all definite groups have been given.

The location of the other items in a table depends largely on the nature of the items and the purpose of the table. For general reference, an alphabetical arrangement is probably the most desirable. Histori-

GROSS DEBT OF STATE GOVERNMENTS

The 48 States Combined, 1922-1931

(In Thousands of Dollars)

| Year | Current | Floating | | Funded or Fixed | TOTAL |
|------|---------|-------------------------------|-------------------|--------------------|-----------|
| | | Debt to Public Trust Funds | Other Floating | | |
| 1922 | 134,721 | * | *42,068 | 985,859 | 1,162,648 |
| 1923 | 159,734 | 38,552 | 6,980 | 1,083,564 | 1,288,830 |
| 1924 | 188,762 | 43,459 | 1,490 | 1,358,932 | 1,592,643 |
| 1925 | 189,993 | 46,306 | 1,225 | 1,508,127 | 1,745,651 |
| 1926 | 195,495 | 39,635 | 13,143 | 1,609,764 | 1,858,037 |
| 1927 | 195,418 | 39,378 | 34,903 | 1,725,729 | 1,995,428 |
| 1928 | 196,273 | 38,477 | 42,191 | 1,867,291 | 2,144,332 |
| 1929 | 244,542 | 37,668 | 46,677 | 1,971,170 | 2,300,057 |
| 1930 | 205,516 | 37,885 | 106,226 | 2,094,495 | 2,444,122 |
| 1931 | 239,768 | 37,769 | 129,458 | 2,259,078 | 2,666,070 |

*Floating debt to public trust funds is included with other floating debt.

Source:—Bureau of the Census, Department of Commerce
Statistical Abstract of the United States, 1933.

J. Jackson
11-2-34

Fig. 5 Simple Typewritten Table

Note use of capitals and underlining for emphasis, separation of columns by spacing, and grouping of years by threes

cal data are generally arranged chronologically. In both cases, the table should read from top to bottom, or from left to right. If the classification of stubs is geographical, a grouping by geographical regions immediately suggests itself. If the ranking of various items is important, they may be arranged in order of size, with the largest at the top or at the left. Those items which are of particular interest or importance may be emphasized by being placed at the top or at the left. If the purpose of the table is kept clearly in mind, the arrangement of items should present few difficulties.

Need for Completeness, Understandability, and Accuracy. Any necessary information which has not appeared elsewhere should be given in footnotes. References to sources should be made. In the

case of working tables, it is important that the name of the compiler and the date be recorded. These references and footnotes should be given somewhere at the bottom of the table, and should be relatively inconspicuous.

There is always the possibility of committing errors when copying figures into a table, and therefore all figures should be checked. Probably the best method of doing this is to have one person read aloud the original data while another reads silently the new table. If possible, tables should be checked by someone other than those who prepared them in the first place; or at least the part played by each person should be altered, in order to minimize the probability of the same error being committed again. Totals may be checked by adding together the totals of the rows and then separately adding the totals of the columns; the two sums should agree. In tables showing percentage distributions, the percentages should be adjusted so as to total 100. Fig. 5 shows a simple table in typewritten form.

CHAPTER III

USE OF GRAPHIC METHODS

Effectiveness of Visual Presentation. It is a commonly recognized fact that a visual presentation of a subject conveys a more definite and lasting impression than words. When someone is slow of comprehension, we often say laughingly, "Oh, draw him a picture." The fact of the matter is, the human race has been absorbing ideas of form and size through its eyes from time immemorial, while the use of printed words and figures to convey ideas is an innovation of fairly recent origin. Graphs depend upon pictures, shapes; tables depend upon words and numbers. True, it is possible to be more meticulously accurate in a table than in any pictorial form of presentation, so that there is a place for both tables and graphs. Scientists have recognized the utility of charts for a long time, but business men and the general public have accepted and learned to use them only in the last two decades. However, their acceptance, though belated, has been rather complete, so that practically every newspaper, many market sheets, and many popular advertisements employ graphic methods.

Basic Types of Charts. There are three primary types of graphic presentation, all of them important and widely used, which we shall consider one at a time. They are (1) simple comparisons of size, (2) arithmetic time curves, and (3) logarithmic time curves. A fourth type, which may be interpreted as a development of type (1), is the frequency distribution. This will be discussed in the next part.

Simple Comparisons of Size. The simplest method of comparing the size or importance of two or more things is to draw a line or a bar to represent each of them, making the lengths of the bars proportional to their size or importance. The eye can readily compare objects which differ in one dimension only, but comparisons of area and of cubic content are much more misleading and difficult of interpretation. For this reason, it is generally advisable to use simple bars of

the same width to represent different magnitudes, rather than to use squares or cubes. This is illustrated in Fig. 6, a comparison of the populations of Louisville and Knoxville. The fact that in 1930 Louis-

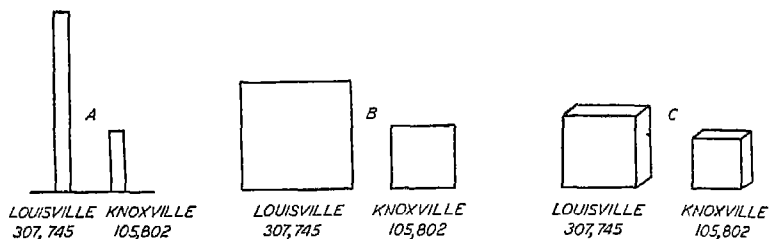


Fig. 6. Demonstration of the Use of Bars, Squares, and Cubes in Comparing Sizes (In this Case, Populations)

ville was almost three times as large as Knoxville is clearly shown by the bars in part A; but part B gives the impression that Knoxville was considerably more than a third as large as Louisville, while the cubes of part C seem to indicate that Knoxville was about two-thirds as large as Louisville.

Bar Charts. Bars may be used to express all sorts of magnitudes, and their arrangement may be either vertical or horizontal. If there are many of them, the horizontal form is preferable. They should all start at a common base line, and their interpretation is simpler if they are shown on a grill with marked values. They may be

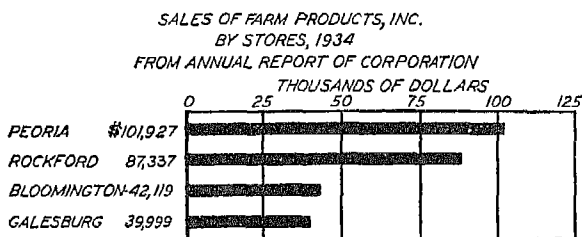


Fig. 7. Horizontal Bar Chart

arranged in order of size, with the largest at the top or at the left; or any other logical order may be employed, as in tabulations. All lettering should be at the left margin and at the bottom, and should read either from left to right, or from the bottom up. In this, as in all succeeding types of charts, the title, source, and any explanatory notes,

as well as definitions of units used, should be clearly set forth. If possible, it is advisable to give the actual figures at the left or bottom of each bar. They should not be shown at the right extremity of the

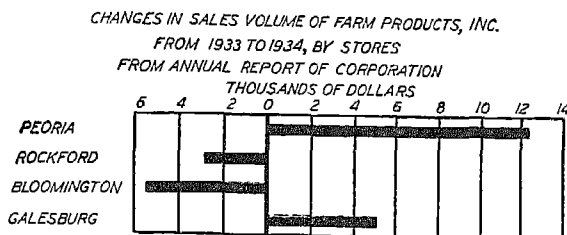


Fig. 8. Horizontal Bar Chart Showing Positive and Negative Changes

bars, because this has the effect of prolonging the bars and thus distorting the relationships between them. All scales should start at zero, or relationships will again be distorted. A sample horizontal bar chart is shown in Fig. 7.

It is possible to show losses and gains by means of a bar chart of

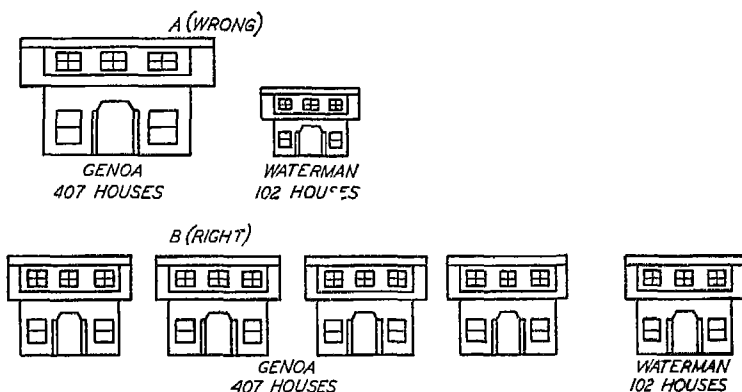


Fig. 9. Two Methods of Showing the Relative Number of Residences in Waterman and in Genoa. Method "A" is Very Misleading

either horizontal or vertical form, showing gains to the right or above the zero line, and losses to the left or below, as in Fig. 8.

Pictorial Forms. A variation of the bar chart is the pictorial chart, in which small figures are used rather than bars. Often figures of different sizes are drawn; but if their proportions remain unchanged, the impression conveyed will probably be incorrect, since more than

one dimension is being used. For this reason, it is best to use small figures of the same size, and to show differences in magnitude by using different numbers of figures. The ideas transmitted in this way are perfectly definite and correct. For instance, there are about four times as many residences in Genoa, Illinois, as in Waterman, Illinois. A house four times as long as another presents sixteen times as much area to the eye, but four small houses make it plain that there are four times as many houses in Genoa as in Waterman. See Fig. 9.

*SALES OF FARM PRODUCTS, INC.
BY STORES AND CLASSES OF COMMODITIES, 1934
FROM ANNUAL REPORT OF CORPORATION*

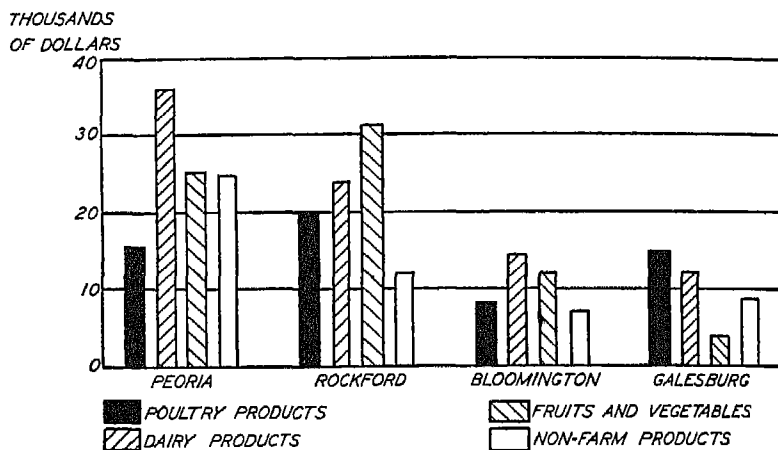


Fig. 10. Vertical Bar Chart, with Bars Differentiated by Shading

Composite Bars. By using bars with different shadings, it is possible to present at one time two or more characteristics of the things under consideration. Thus one chart might reflect a comparison of the sales of poultry products, dairy products, fruits and vegetables, and non-farm products of the four stores of Farm Products, Inc., as in Fig. 10. Not only may simple magnitudes be shown by means of bar charts, but the constituent parts of various magnitudes may also be shown. For instance, instead of using separate bars to represent the different types of commodities sold by Farm Products, Inc., we might have a composite bar for each store, with a separate section representing each type of commodity, as in Fig. 11.

"Pie" Charts. Where magnitudes are not being compared, but only percentage distributions within groups, either composite bars or

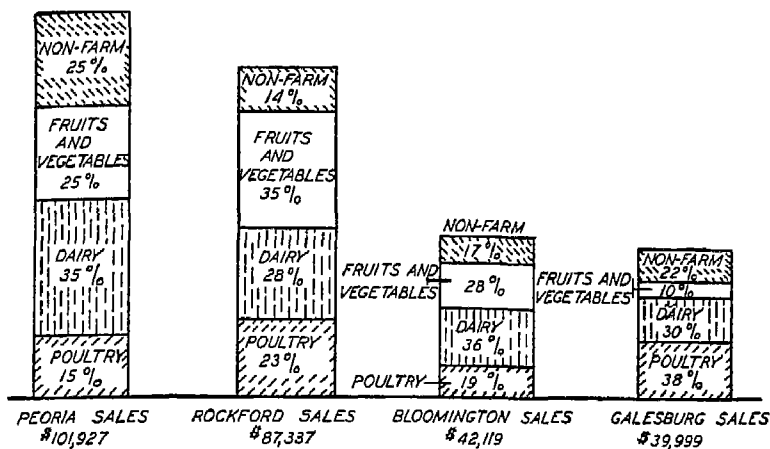


Fig. 11. Composite Bar Chart

so-called "pie" charts may be employed. The latter type of chart consists of a circle cut into wedge-shaped segments to show percentage distributions; it is not satisfactory for comparing magnitudes, be-

SALES OF FARM PRODUCTS, INC.
PEORIA STORE, 1934
CLASSIFIED BY COMMODITIES

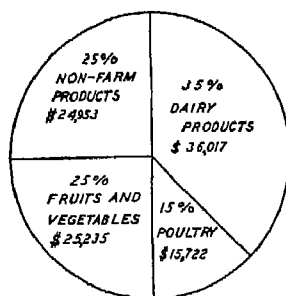


Fig. 12. "Pie" Chart

cause the areas of different-sized circles are difficult to compare. It is proper, however, to show actual amounts as well as percentages on a pie chart. Fig. 12 is an example.

Time Series. One of the most common types of comparison is that between phenomena of the same class at different points in time. Hour to hour, day to day, month to month, and year to year changes are often exceedingly significant, so special methods of picturing these changes have been developed.

It is possible to show variations in magnitude from year to year by means of a vertical bar chart such as we have already discussed. The time scale, which will be horizontal, should read from left to

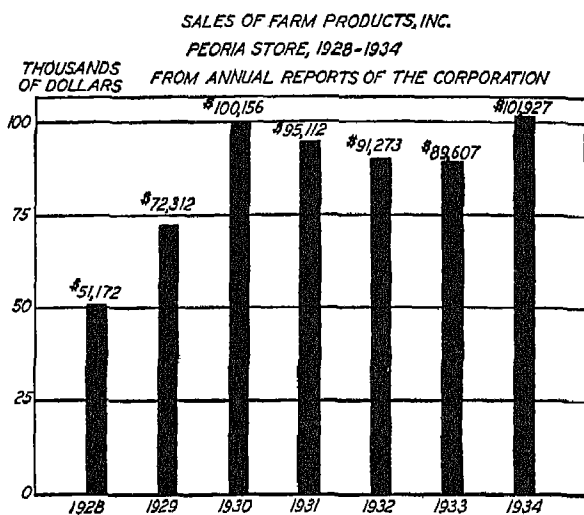


Fig. 13. Vertical Bar Chart of Time Series

right. The spaces between the bars should be proportional to the time intervals. These are the only additional features to be kept in mind. See Fig. 13.

Arithmetic Time Curves. However, another method, closely related to the vertical bar chart, is generally used for presenting time series. This is a curve, either arithmetic or logarithmic—that is, a line or lines that may be curved or straight, smooth, or with sharp corners. We shall take up each in turn.

Coordinate System. The construction of these time curves is based upon the use of coordinates for locating points in a plane. Any text in analytic geometry contains a clear and detailed explanation of the theory of coordinates, so we shall merely review their use. The

coordinate axes are two straight lines at right angles to each other; the X -axis is horizontal and the Y -axis vertical, and they intersect in the origin O . The position of any point, p , may be described by giving its distances from the Y - and the X -axes, respectively, and always in that order. Its distance from the Y -axis is known as the abscissa, and its distance from the X -axis as the ordinate. Thus, in Fig. 14, x is the abscissa of the point p and y is its ordinate, so that the position of p may be accurately described as x, y . The independent variable,

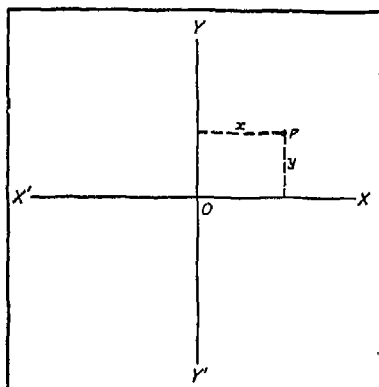


Fig 14 The Coordinate System

which is time in the case of time series, is always measured along the X -axis, and the dependent variable is measured along the Y -axis. Distances to the right of the Y -axis are positive, to the left are negative; distances above the X -axis are positive, below are negative. Most statistical work is done in the first quadrant, which is above and to the right, so that both x and y values are generally positive.

Vertical Scale. The vertical scale used on a time curve should be placed to the left of the last ordinate, just as in the case of a vertical bar chart. It may be repeated at the right, particularly if the chart is unusually broad; but it must be placed at the left. The scale should begin at zero in order to maintain correct proportions. If the scale does not start at zero, a broken line across the bottom of the chart should call attention to this fact. If percentage relatives are being shown, with the curve fluctuating about the 100 per cent line, the zero line may be omitted. Scale numbers should appear directly

opposite the lines which they represent, and a suitable caption should be centered above the vertical scale, defining the units precisely.

Horizontal Scale. The horizontal scale is generally indicated along the bottom of the chart, although it may appear at both the bottom and the top. Most time units, such as years, months, or days of the month, do not need to be designated, as their names are self-explanatory; but a description of the units should be given beneath them, if necessary. The common abbreviations should be used for the months, rather than their first letters alone. If there is not room to letter all abbreviations horizontally, they may be lettered vertically to read from the right margin of the page; or, better yet, only one month a quarter may be lettered, as the intervening months may be readily inferred. The first letter of the day of the week is sufficient for daily data. The year should be given beneath the midmonth of the year, and the month beneath the central day of the month. No marking of any sort is required to show the relations of the different time units to each other, because their mere positions make these relations clear. As in the case of the vertical scale numbers, the horizontal scale designations should be directly opposite the corresponding lines—and, in this case, below the lines.

General Make-up of Chart. On any time curve chart, the curve itself is the most important feature, so it should be drawn more heavily than any other line on the chart. The zero line and, if percentages are being used, the 100 per cent line, are important and should be ruled more heavily than the other coordinate lines, though not so heavily as the curve itself. There should generally be no heavy rulings at the right and left of the chart, since the first and last dates represented are of no especial significance, but are merely the limits which the statistician has selected. However, where the phenomena being charted came into existence on a certain date, or passed out of existence on a certain date, it would be proper to rule heavily the date in question, whether it be initial or terminal. For example, deposits in Federal Reserve Banks would constitute such a series, commencing in 1913.

Step, Broken, and Smoothed Curves. A step curve may be constructed by simply shoving together the bars on a vertical bar dia-

gram, leaving no spaces between them. Such a procedure is advisable if there are abrupt and considerable changes in the value of the variable in question, but not otherwise, because the ordinary broken curve shows direction of change much better than the step curve and enables several series to be plotted on the same chart without confusion. A broken curve is constructed by connecting the plotted points by straight line segments. No significance should be attached to any part of the line between points. For instance, the January, 1934, sales of the Peoria store of Farm Products, Inc., were \$8,765.43 and

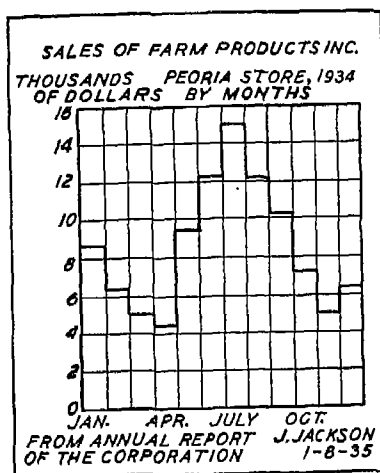


Fig. 15. Step Curve

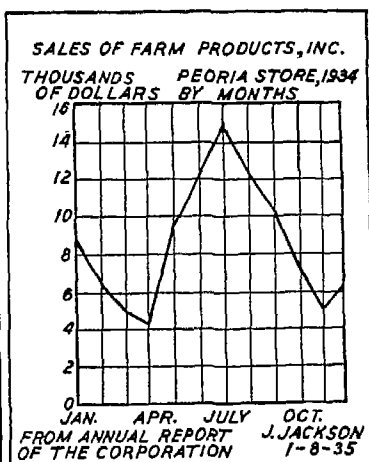


Fig. 16. Broken Curve

the February sales were \$6,532.12; but a point midway between, with a value of \$7,648.78, means nothing but that the average monthly sales in January and February of 1934 were \$7,648.78.

On the other hand, if cumulative sales for the year are charted, every point on the curve is significant, since it means that to that date a certain amount of sales have been made. Of course, if monthly data are used, accurate cumulative figures can be secured by months only; but interpolation between points is fairly accurate. Since it is illogical to assume that changes in the rate of sales, or in whatever other phenomenon is being measured, occur suddenly at monthly intervals, a cumulative curve should probably be smoothed rather

than having sharp turning points. Step and broken curves are illustrated in Figs. 15 and 16, and a smoothed cumulative curve is shown in Fig. 17.

Special Types of Arithmetic Time Curves. It is often desired to chart two or more series on the same graph. If absolute magnitudes are to be compared, rather than mere directions of fluctuations, the units in which the different series are expressed must be the same.

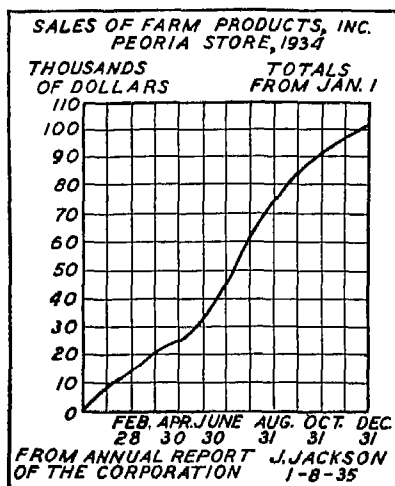


Fig 17 Smoothed Cumulative Curve

This use of common units is not necessary if magnitudes are not to be compared. When two or more curves are being shown on one chart, and particularly if they are close together or cross each other, they must be differentiated by the use of different colored inks or of different types of lines, such as solid, dotted, dashed, or various dot-dash combinations.

The thing that each curve represents may be lettered near the curve on the graph, or may be shown separately in a "legend." The first method is generally preferable, because curves so labeled are easier for the reader to understand. Lettering should be horizontal, if possible; but it may be tipped up on edge with the letters running from the bottom upward. Sometimes it may be necessary to designate

by means of an arrow the curve to which a label refers. When showing several curves on the same chart, the general rule is to avoid complexity and confusion by handling all lettering in such a manner as to make the chart most easily read. Rather than show too many curves on a single chart, it is often advisable to show each on a separate chart, with all charts drawn on the same scale and arranged in such a manner as to facilitate comparisons.

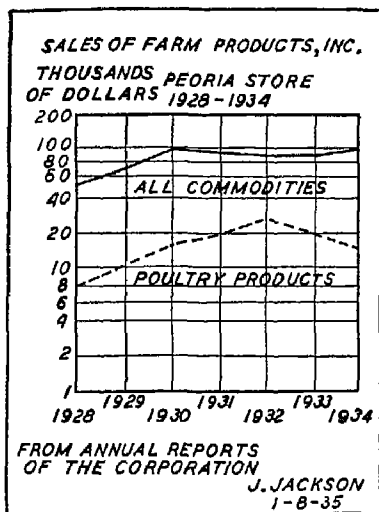


Fig. 18. Logarithmic Chart

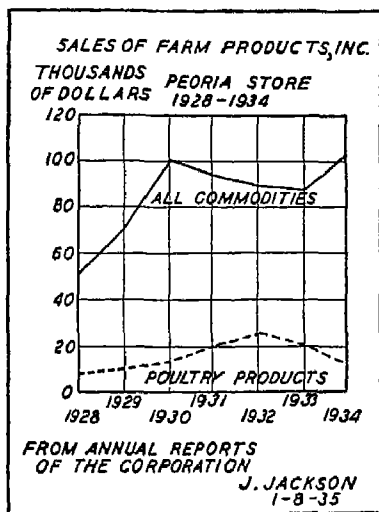


Fig. 19. Arithmetic Chart

Logarithmic Time Curves and Their Application. If it is desired to compare not absolute size of change from time to time, but rate of change, the arithmetic time curves which we have discussed are supplanted by logarithmic curves. While a constant absolute increase appears as a straight line on an arithmetic chart, a constant rate of increase appears as a straight line on a logarithmic chart, since the vertical scale is logarithmic rather than arithmetic. For instance, an increase from 1 to 10 seems to be only one-tenth as important as a change from 10 to 100 when shown on an arithmetic chart; but the two gains, each one a 900 per cent increase, appear to be of equal importance on a logarithmic chart. The principle of the logarithmic scale is that the distance between any two values is the same as that

between any other pair of numbers bearing the same ratio to each other. Thus, the distance from 1 to 2 equals the distance from 2 to 4, from 3 to 6, from 9 to 18, from 300 to 600, and so on.

The logarithmic chart, which has come into general use only recently, aids not only in comparing rates of change in the same series at different points of time, but is even more valuable for comparing fluctuations in two or more series of widely different magnitudes. This use is illustrated in Fig. 18. An arithmetic chart, Fig. 19, would seem to indicate that annual sales of poultry products have fluctuated much less than have total annual sales, but the logarithmic presentation makes it readily apparent that sales of poultry products, in proportion to their volume, have been less stable than sales of all commodities. The ease of comparison may be increased by using two or more scales in order to bring the curves closer together.

Vertical Scale. Graph paper ruled with a logarithmic vertical scale and an arithmetic horizontal scale, sometimes called semi-logarithmic paper, is arranged in "cycles" ranging from 1 to 10. Each sheet of paper may contain one, two, three, or more cycles, with each additional cycle accommodating numbers of one more digit. Since the scale can never descend to zero (because any increase from zero would be an infinitely large percentage increase), and all quantities are always of the same sign, the bottom line of a logarithmic chart is not ruled heavily, as is the zero line of an arithmetic chart. Generally the scale should start with 10 or some multiple of 10, although this is not absolutely necessary so long as the proper relations are maintained between scale numbers.

Other Types of Charts. Besides the three types of graphs which we have thus far considered, there are several others which are widely used in business; these include statistical maps and frequency curves, each of which we shall consider in later chapters.

Additional Requirements of a Good Chart. In addition to the foregoing qualifications, a good chart contains the name of the one who prepared it, the date, and a reference to the source; these facts usually appear at the bottom of the chart. A border should also be ruled around the chart.

CHAPTER IV

PRESENTATION OF STATISTICAL DISTRIBUTIONS

Meaning of Distribution. An unorganized mass of statistical data is not only unfit for presentation to those for whom it is intended, but it is very nearly meaningless to the statistician himself. In order to facilitate analysis of the information and thus pave the way for further statistical treatment and final presentation in textual, tabular, or graphic form, the individual items of information must be arranged in some orderly and logical manner. Such an orderly arrangement of the component parts of an aggregate of data is known as a statistical distribution, because the individual items are distributed according to some logical standard.

Types of Distributions. Several types of distributions immediately suggest themselves; each is constructed on a basis different from the others and each serves a special purpose. There are distributions according to kind, geographical distributions, historical distributions, and distributions according to size or some other mathematically expressible characteristic, such as degree of variation. We shall discuss each in turn, with special emphasis on distributions according to size.

Distributions According to Kind. Little explanation is needed of distributions according to kind. A store selling four different groups of commodities may classify its sales by commodity groups, as Farm Products, Inc., does in Figs. 10, 11, and 12. All individual sales are distributed among these four classes: poultry products, dairy products, fruits and vegetables, and non-farm products. If the relative importance of different kinds of items is the subject of interest, a distribution according to kind is called for.

Geographical Distributions. A geographical distribution, in which the items are classified by location, is often useful in conducting market surveys, population studies, surveys of production of different

commodities, and any one of a myriad other types of statistical studies in which relationships of space are of primary importance. The geographical unit employed may be the continent, the nation, the state, the county, the city, or some smaller division, depending upon the object, scope, and precision of the study. A cleaning and pressing chain might divide the city into areas of a few square blocks each, in a survey for the purpose of deciding on the locations for its stations; while the manufacturer of a new radio might use areas as large as states, or at least metropolitan areas, in determining the location of his branch sales offices.

Types of Geographical Distributions. There are three general types of geographical distributions. The first relates to the number or magnitude of the phenomena in question within a given area; the second gives the density of the phenomena—their number per square mile or other dimensional unit; the third shows the number as related to some second factor other than space, as radios per thousand of population, bath tubs per family, or pupils per high school.

The simplest type of geographical distribution, that concerned with number or size within a given area, is often presented graphically by the use of dots or circles of different sizes to represent different magnitudes. This method is undesirable because of the difficulty of comparing areas. A superior arrangement is to let each dot represent a certain number of units and to denote different numbers in the different areas by using the correct number of dots in each case. The number of units represented by each dot should be chosen so as to give the map reasonable accuracy and still not make it too complicated. Fig. 20 is a sample map of this sort.

Densities. Often we are interested not in mere number, but in intensity or concentration of the phenomena in different areas. These densities are found by adjusting the number in each unit of area for the size of the area. Probably the simplest pictorial presentation consists in merely letting a dot represent a certain number of units and then distributing the proper number of dots evenly over each area in question. The size of the dots, and the number of units which each represents, should be so chosen that no significant data will be

omitted from the map, and yet so that the dots will not overlap and form several layers where the density is greatest. The dots will be much smaller and more numerous than where mere number is being shown.

Another method of showing densities, and one that is also used for picturing the number in each area in relation to some third factor, is to employ different types of "crosshatching" to represent different intensities. It is customary to use shadings with more black in them as the intensity increases, ranging from pure white to solid black.

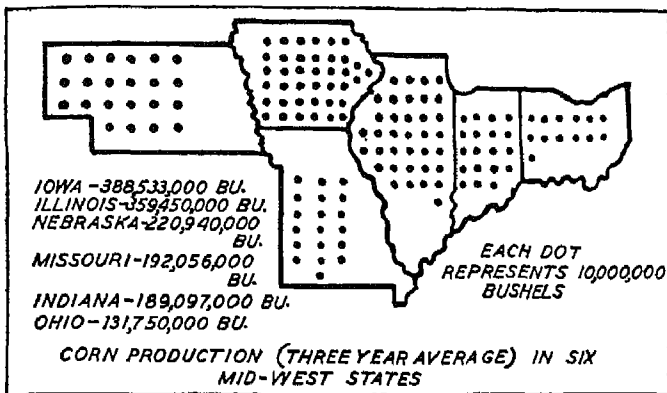


Fig. 20. Simple Geographical Distribution Map

For instance, areas receiving less than ten inches of rainfall a year might be left blank; areas receiving from ten to twenty inches might be shaded with lines running upward to the right; from twenty to thirty, horizontal lines; from thirty to forty, lines running upward to the left; from forty to fifty, vertical lines; from fifty to sixty, a network of lines running upward to both right and left; and above sixty inches per year, solid black.

The number of horses per thousand people in each state or county might be shown in the same manner. Class intervals must be few enough in number so that their multiplicity will not be confusing and so that each may be given a distinctive type of crosshatching. Generally, from four to six classes are used. An illustration, using corn yields per acre, is given in Fig. 21.

Historical Distributions. Historical distributions are important, because such statistics as production and sales figures for a period are of especial significance only when compared with similar statistics for other periods. Whenever a certain type of phenomena, expressible in mathematical units, has occurred cumulatively throughout a period of time, the aggregate of such phenomena may be divided according to smaller periods of time, forming a historical distribution. It must not be inferred, however, that all time series are historical distributions.

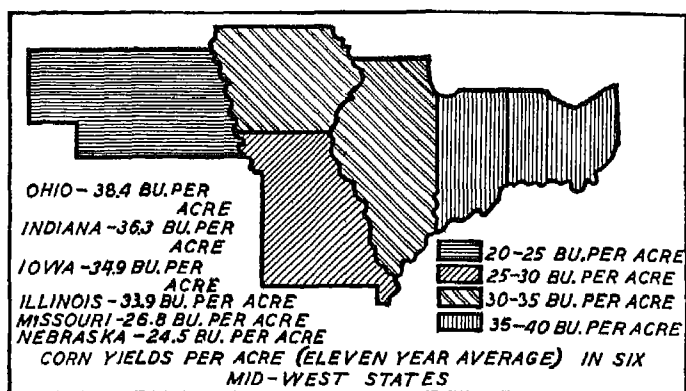


Fig. 21. Geographical Distribution Showing Densities

There are two conditions which the time series must fulfill in order to be a historical distribution: The time units must be actual dates, and not merely the first month, second month, and so on; the phenomena must be such that the number for any one small period of time is but a fraction of the aggregate of the phenomena for the entire length of the series. In other words, price figures for each month of a year would not constitute a historical distribution; but sales figures would, since the sales for the twelve months total to form the sales for the year. Time series will be discussed at much greater length in subsequent pages.

Distributions by Size or Degree. Often data are collected on one type of phenomena where the differences in the size of the individual observations are more important than their location, time, or

POPULATION OF DE KALB COUNTY, ILLINOIS

By Townships, 1930

| Township | Population |
|-------------|------------|
| De Kalb | 9,927 |
| Sycamore | 4,741 |
| Sandwich | 2,913 |
| Genoa | 1,762 |
| Squaw Grove | 1,331 |
| Shabbona | 1,325 |
| Franklin | 1,210 |
| Clinton | 1,179 |
| Cortland | 1,078 |
| Malta | 966 |
| Somonauk | 966 |
| Kingston | 868 |
| South Grove | 675 |
| Mayfield | 655 |
| Pierce | 636 |
| Afton | 633 |
| Paw Paw | 620 |
| Milan | 593 |
| Victor | 566 |
| TOTAL | 32,644 |

Fig. 22. Array of Populations of the Nineteen Townships of De Kalb County, Illinois

subclassification of kind. For instance, we might collect information on the circulation of every weekly newspaper in Illinois. Rather than classify the papers by counties, we might arrange them in the order of the size of their circulations, from the largest to the smallest, or vice versa.

The resulting orderly arrangement, showing the proper relationship of each paper to every other so far as circulation is concerned, is called an "array."

DISTRIBUTION OF STUDENTS AT SIWASH COLLEGE
By Age in Years

November 1, 1934

| Age in Years | Number of Students |
|--------------|--------------------|
| 15 | 2 |
| 16 | 5 |
| 17 | 41 |
| 18 | 99 |
| 19 | 172 |
| 20 | 203 |
| 21 | 167 |
| 22 | 85 |
| 23 | 31 |
| 24 | 17 |
| 25 | 9 |
| 26 | 4 |
| 27 | 1 |
| 28 | 2 |
| 29 | 1 |
| Total | 839 |

Source: Office of Registrar

G. Fitch, Jr., 11-3-34

Fig. 23. Simple Frequency Distribution (Each Value is Shown Separately)

Use of the Array. Certain information is brought out by an array that is not revealed in the original data. The highest and the lowest values are obtained; and, if the items are few in number, a fair idea of the distribution of the items between these extremes may be secured. For instance, an array would probably be the proper form of presentation for the populations of the townships of De Kalb County, Illinois, see Fig. 22. When the items are more numerous, however, as in our newspaper study, there are certain questions which the array does not answer very clearly. For instance: "Are there more circulations under two thousand copies than there are over two thousand?" "What is the average circulation?" These shortcomings of the array as a final form for data make further handling necessary, and the next step is generally the making of a frequency distribution.

Frequency Distribution. As in an array each of the items appears separately, even though there may be several items with the same value, simplification is attained in the case of the frequency distribution by throwing together similar values. There are two types of frequency distributions: One shows each value separately and gives the frequency of items having that value; the other has classes with definite value limits and throws together all items having values between those limits. The first type is often used with discontinuous series having relatively few values, Fig. 23; while the type with class intervals is used wherever there is a wide range of values shading off into each other by many small steps, or, in other words, a continuous series, Fig. 24.

| DISTRIBUTION OF EMPLOYES OF THE THOM POTTERY, INC. | |
|----------------------------------------------------|------------------------|
| By Weekly Earnings | |
| Week Ending May 14, 1934 | |
| Weekly Earnings in Dollars | Number of Employees |
| 9.00-10.99 | 2 |
| 11.00-12.99 | 5 |
| 13.00-14.99 | 6 |
| 15.00-16.99 | 8 |
| 17.00-18.99 | 11 |
| 19.00-20.99 | 23 |
| 21.00-22.99 | 28 |
| 23.00-24.99 | 22 |
| 25.00-26.99 | 17 |
| 27.00-28.99 | 13 |
| 29.00-30.99 | 6 |
| 31.00-32.99 | 4 |
| 33.00-34.99 | 3 |
| 35.00-36.99 | 1 |
| Total | 149 |

Fig. 24. Frequency Distribution According to Class Intervals

Problem of the Class Interval. The first type of a frequency distribution lets each value be a class interval, so to speak, so there is no problem of selecting class intervals here. This becomes, however, quite an important problem if the second type of distribution is being used. There are three important factors which must be considered in selecting the class intervals.

First, they must be small enough so that the mid-point of each class interval will be fairly representative of all of the items within the class interval. The process of combination naturally entails some sacrifice of accuracy, but this loss of accuracy generally increases as the size of the class interval increases; on that score, a fine classification is preferable to a coarse classification.

Second, and operating in the opposite direction, is the fact that the data at hand usually constitute a small sample of the universe of phenomena being studied, so that many irregularities disclosed in the data are the result of sampling rather than typical of the universe of data. The finer the classificatory system, the smaller the class interval, the more important will be the effects of this sampling, since errors of sampling will have less chance to cancel each other within the class interval. This factor, then, dictates class intervals large enough and few enough so that the distribution will be fairly smooth and free from abrupt changes in opposite directions—more nearly approximating what we think the distribution of the items in the whole universe would be like. These first two factors must be balanced against each other, and the result should be a distribution with class intervals somewhere between ten and twenty-five in number.

The third factor is the result of the tendency of many types of data to have clusters of items about certain values, generally non-fractional values, while the values in between occur with relatively low frequency. If the mid-point of the class interval is to be truly representative of all of the items in the class interval, it must fall on one of these clusters or points of greatest frequency. For instance, if we were studying the stated interest rates on the bond issues in a certain industry, we should find that more interest rates fall on integers such as 4%, 5%, or 6%, than on halves of percentages such as $4\frac{1}{2}\%$, $5\frac{1}{2}\%$, or $6\frac{1}{2}\%$; and that more issues bear rates of something-and-a-half per

cent, than of quarter percentages such as $4\frac{1}{4}\%$, $4\frac{3}{4}\%$, $5\frac{1}{4}\%$, and so on.

In such a study, in order to approach a symmetrical distribution of the individual items within each class interval, it would be advisable to let the class intervals extend from $3\frac{3}{4}\%$ to, but not including, $4\frac{1}{4}\%$; from $4\frac{1}{4}\%$ to, but not including, $4\frac{3}{4}\%$; from $4\frac{3}{4}\%$ to, but not including, $5\frac{1}{4}\%$, and so on, thus making the mid-points fall on the whole and half per cent values. If, instead of a class interval of one-half a per cent, one of a whole per cent were desired, the range of each class interval would extend from one-half a per cent to, but not including, the next half a per cent; as $4\frac{1}{2}\%$ to, but not including, $5\frac{1}{2}\%$. The same would be true of finer classifications, class intervals of one-fourth a per cent extending from $3\frac{7}{8}\%$ to, but not including, $4\frac{1}{8}\%$; from $4\frac{1}{8}\%$ to, but not including, $4\frac{3}{8}\%$, etc. Sometimes clusters do not occur at regular intervals, and therefore some class intervals will not center on clusters; but this difficulty cannot be avoided.

Defining Class Limits. The limits of the class intervals must be clearly defined, as given above, because if this is not done there will be a question as to which class interval an item appearing on a limiting value belongs. The class intervals 0-2, 2-4, 4-6, 6-8, 8-10, unless accompanied by some explanation, are not mutually exclusive. Sometimes such intervals are expressed as 0-1.95, 1.95-3.95, 3.95-5.95, 5.95-7.95, 7.95-9.95, or in some other fraction so that the limits are expressed in smaller units than those in which the items are measured. While the mid-point is theoretically changed by such a statement of units, it is generally still treated as if the limits fell on the more even numbers. For example, the mid-points of the class intervals listed above would be 1, 3, 5, 7, and 9 respectively.

Uniformity of Class Intervals. Ordinarily, all class intervals should be of the same size, so that the frequencies in all intervals will be readily comparable. This principle is often violated, and then misleading conclusions result. If a finer classification is desired in one part of the range of the data than in another, this is generally best accomplished by showing the entire distribution according to the rougher classification, and then drawing up a separate distribution over that range where the finer classification is desired.

A corollary to this principle of equal class intervals is the fact that there should be no open-end classes, such as "less than 5" or "more than 70." The frequency within such an indefinite class is not comparable with the frequencies in the other class intervals, and no mid-point can be selected to represent such a class. If the wide dispersion of items at the extremes of a frequency distribution makes it infeasible to include them in ordinary classes, open-end classes may be used with footnotes giving the actual values of the items included. Generally such open-end classes are discarded when computing the various measures of the distribution. A frequency distribution of the

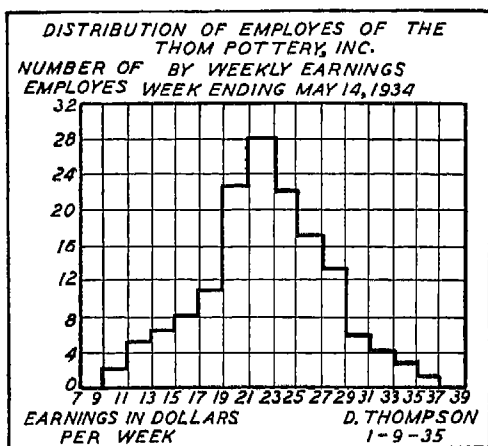


Fig. 25. Column Diagram of Frequency Distribution

wages of the employees of a midwestern pottery is shown in tabular form in Fig. 24, and presented graphically in Fig. 25.

The Problem of Smoothing. In the case of a discontinuous series, one in which each value is shown separately and there is no combination of unlike values, such a step diagram as that shown in Fig. 25 accurately represents the distribution of the items, and smoothing is not called for. In a continuous series, however, we know that values do not actually increase by sharp steps, but rather by a gradual blending of one value into the next. Therefore, it is desirable to smooth such a distribution, producing a smooth curve. The smoothing should be done in such a manner that the area within each class interval will be unchanged. This means that what a class interval

loses at its outer edge it will gain at its inner edge, and that the smooth curve will slightly overtop the central column of the column diagram. The column diagram of Fig. 25 is smoothed in Fig. 26. It will be noted that the latter extends clear to the X -axis on either side, so that the curve and the X -axis describe a definite area.

In actual practice with continuous data, a step diagram is rarely constructed. Its place is taken by the frequency polygon, in which the frequency of each class interval is plotted at the mid-point of the class interval as a point, and these points are then connected by straight

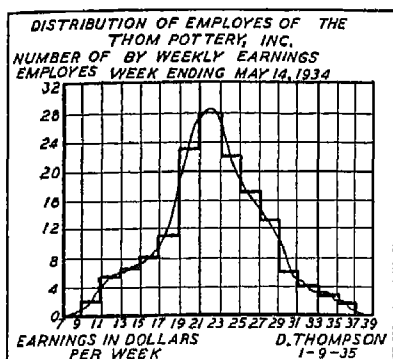


Fig. 26 Smoothed Frequency Distribution, from Column Diagram

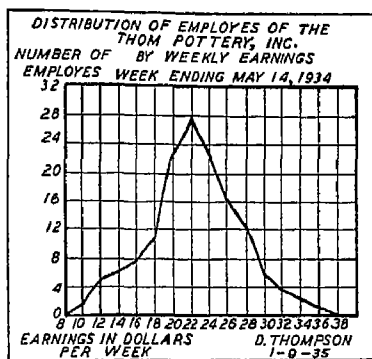


Fig. 27. Frequency Polygon

line segments. A frequency polygon is shown in Fig. 27, which uses the same data as Figs. 24, 25, and 26.

Shapes of Frequency Distributions. What forms may a frequency distribution take? The most familiar shape is that of the normal curve of error, or bell-shaped curve, often termed a "normal" distribution. However, this type of distribution is very rarely found in business data, as the curves are usually skewed to the right or to the left. Some types of data describe J-shaped curves, in which the low values have high frequencies and the frequencies decrease rapidly as the values increase. The reverse situation is sometimes, but rarely, true; the reason for its rarity is that there is no definite upper limit to correspond to zero as a lower limit.

Another type of distribution is U-shaped, where both the small and the large values have high frequencies, with the intervening values

low in frequency. This type of distribution is very rare in business statistics. A good example taken from meteorology is the percentage of the sky which is overcast by clouds on each day of the year. Most

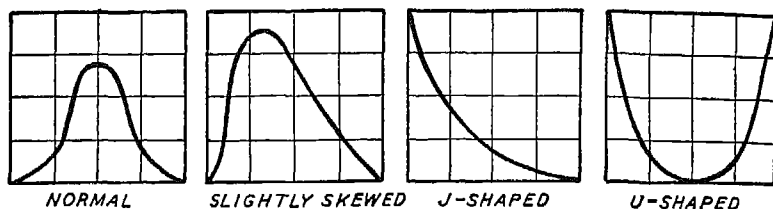


Fig. 28. Types of Frequency Curves

days are either very clear or almost completely overcast, so a U-shaped curve results. These four general types of curves are shown in Fig. 28.

Cumulative Distributions. A cumulative frequency distribu-

DISTRIBUTION OF EMPLOYEES OF THE THOM POTTERY, INC.

By Weekly Earnings

Week Ending May 14, 1934

Cumulative Frequencies

| Weekly Earnings in Dollars | Number of Employees | Weekly Earnings in Dollars | Number of Employees |
|-------------------------------|------------------------|-------------------------------|------------------------|
| Less than \$8.99 | 0 | More than \$9.00 | 149 |
| Less than 10.99 | 2 | More than 11.00 | 147 |
| Less than 12.99 | 7 | More than 13.00 | 142 |
| Less than 14.99 | 13 | More than 15.00 | 136 |
| Less than 16.99 | 21 | More than 17.00 | 128 |
| Less than 18.99 | 32 | More than 19.00 | 117 |
| Less than 20.99 | 55 | More than 21.00 | 94 |
| Less than 22.99 | 83 | More than 23.00 | 66 |
| Less than 24.99 | 105 | More than 25.00 | 44 |
| Less than 26.99 | 122 | More than 27.00 | 27 |
| Less than 28.99 | 135 | More than 29.00 | 14 |
| Less than 30.99 | 141 | More than 31.00 | 8 |
| Less than 32.99 | 145 | More than 33.00 | 4 |
| Less than 34.99 | 148 | More than 35.00 | 1 |
| Less than 36.99 | 149 | More than 37.00 | 0 |

Note—The limits are included when figuring the frequencies; thus, less than \$14.99 means \$14.99 or less, and more than \$21.00 means \$21.00 or more.

Fig. 29. Cumulative Frequency Distributions, Upward and Downward

tion, the S-shaped curve of which is called an "ogive," may be readily constructed from an ordinary frequency distribution by merely add-

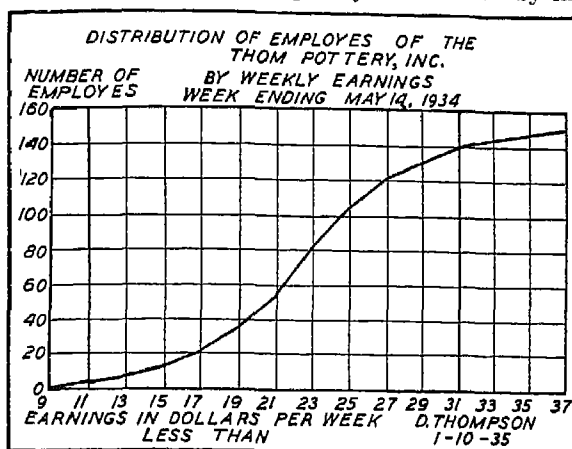


Fig. 30. Cumulative Frequency Distribution (Cumulated Upward)

ing the frequency at each value to the preceding total of frequencies. Such a distribution may be cumulated either upward or downward, and the values are read as "less than" and "more than" the upper and

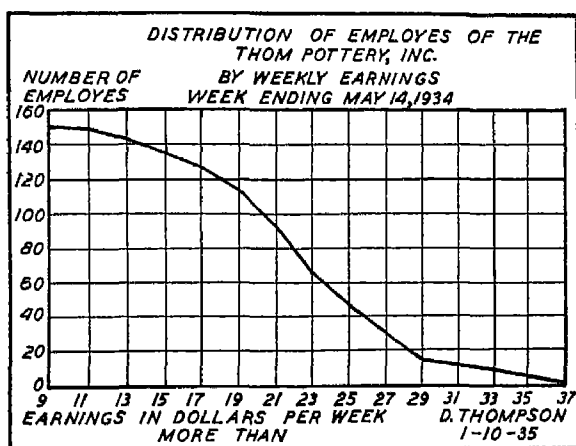


Fig. 31. Cumulative Frequency Distribution (Cumulated Downward)

lower limits, respectively, of the class intervals in question. Both types of cumulative frequency distributions, using the wage data, are tabulated in Fig. 29 and charted in Figs. 30 and 31.

CHAPTER V

AVERAGES AND MEASURES OF DISPERSION

Importance of Methods of Measurement. Statistical analysis is always directed toward the simplification of data so that they can be more readily understood and compared with other data. Just as the items with values falling within a certain class interval are assumed to be represented by the mid-point of the class interval, it is desirable also to secure one value which will be representative of the entire frequency distribution. We want to know what is the average wage in a certain plant, the average size of farm in a certain township, the average price of heavy cotton work socks in a certain city. While the mind cannot grasp a great many facts at once in their proper relationships, it is capable of taking hold of a few definite measures.

Besides knowing the average value of some phenomenon, we should like to know also just how typical is the central measure of the whole mass of data on the phenomenon—how closely the individual items group themselves around the central value. One or more of the common measures of dispersion will answer this question. Is the distribution symmetrical about the central value, or is it skewed to the right or left? A measure of skewness or lopsidedness will provide an answer. Is the distribution pointed at the top or relatively flat? A measure of “kurtosis” or “flat-toppedness” will tell us. In other words, four measures, one of central tendency, one of dispersion, one of skewness, and the other of kurtosis enable us to describe briefly a frequency distribution and compare it with other such distributions. We shall consider only measures of central tendency and dispersion, since measures of skewness and of kurtosis are not so widely used in business statistics.

Arithmetic Mean. The most familiar of all the averages is the ordinary arithmetic mean, computed by adding together the values of all the items and dividing by the number of items. In fact, when we

COMPUTATION OF ARITHMETIC MEAN OF WEEKLY EARNINGS

Employees of The Thom Pottery, Inc.

Week Ending May 14, 1934

| Weekly Earnings in Dollars | Mid-point of Class | Frequency | Product |
|-------------------------------|-----------------------|-----------|---------|
| 9.00-10.99 | 10 | 2 | 20 |
| 11.00-12.99 | 12 | 5 | 60 |
| 13.00-14.99 | 14 | 6 | 84 |
| 15.00-16.99 | 16 | 8 | 128 |
| 17.00-18.99 | 18 | 11 | 198 |
| 19.00-20.99 | 20 | 23 | 460 |
| 21.00-22.99 | 22 | 28 | 616 |
| 23.00-24.99 | 24 | 22 | 528 |
| 25.00-26.99 | 26 | 17 | 442 |
| 27.00-28.99 | 28 | 13 | 364 |
| 29.00-30.99 | 30 | 6 | 180 |
| 31.00-32.99 | 32 | 4 | 128 |
| 33.00-34.99 | 34 | 3 | 102 |
| 35.00-36.99 | 36 | 1 | 36 |
| Total | | 149 | 3,346 |

$$3,346 \div 149 = \$22.456, \text{ the arithmetic mean of wages in the pottery.}$$

Fig. 32. Computation of the Arithmetic Mean from Grouped Data

speak of an average without qualifying the term, we generally refer to the arithmetic mean. Its computation is very simple when there are few items, but becomes more complicated as the items increase in number. Whereas in ungrouped data each individual item is added separately, larger distributions with grouped data are handled in a slightly different manner. As has been noted before, the mid-point of each class interval is assumed to be representative of all of the items within the class. Therefore, the mid-point of each class interval is multiplied by the frequency for that class interval, all of these products are totaled, and the result is divided by the number of items to give the arithmetic mean. This method of computation is illustrated in Fig. 32, using the wage data of the Thom Pottery, Inc.

The arithmetic mean is often a good average to use because it is always determinate and fairly easy to compute, has a perfectly definite and generally understood meaning, and lends itself readily to algebraic manipulation, which is just another way of saying that it may be further treated arithmetically. On the other hand, it may be influenced too much by extreme deviations from the average; therefore other measures of central tendency are superior for special purposes.

Mode. We often speak of something as being typical—such as a typical man, a typical sale, or a typical family. What we mean is that that particular man, sale, or family belongs to that class of men, sales, or families which is most numerous in the universe under consideration. Such a class is called the modal class, and such a value is called the modal value or mode.

It is difficult to find the exact mode in a frequency distribution. True, it is simple to locate the class interval with the largest number of cases falling within it, and, if the class intervals have been chosen in accordance with the principles laid down in Chapter IV, we may generally take the mid-point of this class interval as our mode. However, the use of a different class interval may give us a different mode, so this method is not entirely accurate. A more accurate determination of the position of the mode is possible, but the methods are too detailed for presentation here.

A rough and simple method of determining the value of the mode is to drop a perpendicular from the highest point on the smoothed frequency curve to the X -axis; then the distance from the point of intersection with the X -axis to the origin O is the mode. This is a horizontal distance, because the height of the curve is not the mode, as is often stated, but the frequency of the modal group. See Fig. 33.

The mode is often a valuable measure, since it is the point of greatest frequency and is not affected by extreme items. However, it is difficult to locate exactly, cannot be manipulated algebraically, and is not significant unless the sample used is rather large and possesses a distinct central tendency.

Median. The third important measure of the central tendency is the median, the point below and above which occur equal numbers

of items. No difficulty is experienced in locating the median in ungrouped data, since the number of items is merely divided by two and the item occurring in the middle position is the median. For instance, in the series of five numbers, 2, 6, 7, 11, and 12, the third number, 7, is the median, since $2\frac{1}{2}$ items are located above it and $2\frac{1}{2}$ items are located below it. If there is an even number of items, the median is given a value half-way between the two central items; for example, in the series 1, 7, 8, 10, 13, and 17, there are six items; one-half of six is three, therefore, there must be three items below

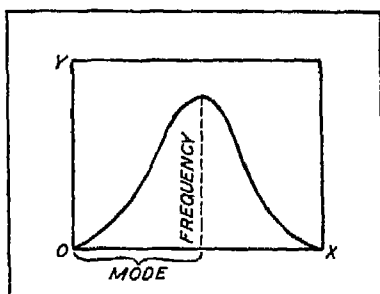


Fig 33 Diagram Illustrating the Mode

and three above the median. Since 8 is the third item and 10 is the fourth, the median is 9, half-way between 8 and 10.

In the case of grouped data, the class interval within which the median falls is readily located; after that the position of the median within the class interval is found in the following manner: To the lower limit of the class interval in which the median lies is added that fractional part of the class interval which the number of items yet needed to reach the mid-item bears to the number of items within the class interval. For example, if there were thirty-four items in a distribution, fifteen items (two less than the mid-point, seventeen) below the class interval of \$10.00 to \$11.99, and seven items within that class interval, the median would be $\$10 + (\frac{2}{7} \times \$2) = \$10.57$.

At times the median is a particularly valuable measure because it is not affected by extreme items and may be located even if some of the items are not known, provided their general location is known and provided the central group of items has been accurately ascertained

However, since it is a position rather than a pure computed average, it does not lend itself readily to algebraic manipulation.

All Averages Valuable. In conclusion, it may be said that each of the three averages discussed in this chapter has a definite place in the field of business statistics, as do the geometric and harmonic mean which we have not discussed; but the arithmetic mean and the median are more widely used and more generally understood than the mode, geometric mean, and harmonic mean.

Measures of Dispersion. An average is very significant if the individual items cluster about the average; then the ultimate is a set of items with the same value. At the other extreme, we may have a series of items which exhibit no tendency toward concentration whatsoever; in that case an average is of no value. For instance, 25 is the arithmetic mean of the series 1, 2, 35, and 62, but the number 25 is certainly not representative of the series. An average, if it is to achieve its greatest usefulness, must be accompanied by some measure of the dispersion of the individual items from that average. The range, quartile deviation, average deviation, and standard deviation are such measures.

Range. The range simply shows the difference between the largest and smallest items in the distribution; or, in the case of grouped data, the difference between the upper limit of the highest class interval and the lower limit of the lowest class interval. It may be readily found by the one simple operation of subtraction, either from an array or from a frequency distribution. Since its size is dependent upon the location of the two extreme items alone, and these extreme items may show considerable differences in value without materially affecting the distribution as a whole, the range is used only as a rough measure of dispersion, with the exception of a special use in reporting stock prices.

Quartile Deviation. Just as the median point is the one in a frequency distribution below which one-half the items occur and above which the other half occur, so the quartiles are the points below which one-fourth, one-half, and three-fourths of the items occur. The first quartile is exceeded in value by three-fourths of the items, the second quartile coincides with the median, and the third

COMPUTATION OF MEAN DEVIATION OF WEEKLY EARNINGS

Employees of The Thom Pottery, Inc.

Week Ending May 14, 1934

| Weekly Earnings in Dollars | Mid-point of Class | Deviations from Median | Frequency | Cumulative Frequency | Product |
|-------------------------------|-----------------------|---------------------------|-----------|-------------------------|---------|
| 9.00-10.99 | 10 | 12.4 | 2 | 2 | 24.8 |
| 11.00-12.99 | 12 | 10.4 | 5 | 7 | 52.0 |
| 13.00-14.99 | 14 | 8.4 | 6 | 13 | 50.4 |
| 15.00-16.99 | 16 | 6.4 | 8 | 21 | 51.2 |
| 17.00-18.99 | 18 | 4.4 | 11 | 32 | 48.4 |
| 19.00-20.99 | 20 | 2.4 | 23 | 55 | 55.2 |
| 21.00-22.99 | 22 | 0.4 | 28 | 83 | 11.2 |
| 23.00-24.99 | 24 | 1.6 | 22 | 105 | 35.2 |
| 25.00-26.99 | 26 | 3.6 | 17 | 122 | 61.2 |
| 27.00-28.99 | 28 | 5.6 | 13 | 135 | 72.8 |
| 29.00-30.99 | 30 | 7.6 | 6 | 141 | 45.6 |
| 31.00-32.99 | 32 | 9.6 | 4 | 145 | 38.4 |
| 33.00-34.99 | 34 | 11.6 | 3 | 148 | 34.8 |
| 35.00-36.99 | 36 | 13.6 | 1 | 149 | 13.6 |
| TOTALS | | | 149 | | 594.8 |

Since there are 149 items, the median must be the value of that point below which are located $74\frac{1}{2}$ items, with $74\frac{1}{2}$ items above. This point falls in the class interval from \$21.00 to \$22.99. To the lower limit of this class interval, \$21.00, is added the number of items yet required to reach the mid-item ($74\frac{1}{2} - 55 = 19\frac{1}{2}$) divided by the number of items in that class interval (28) and multiplied by \$2.00, the size of the class interval. In short, $\text{Median} = \$21.00 + \frac{19.5}{28} \times \$2 = \$21.00 + \$1.3929 = \$22.3929$, which we shall round off to \$22.40.

The sum of the deviations from the median, 594.8, is divided by the number of items, 149, giving the mean deviation, 3.99, which is really \$3.99.

Fig. 34. Computation of the Mean (Average) Deviation, Using the Median as Origin

quartile is exceeded by only one-fourth of the items in the distribution.

The quartiles are located within class intervals in exactly the same manner as is the median. The difference in value between the third and first quartiles is known as the interquartile range; and,

divided by two, as the semi-interquartile range or quartile deviation. This measure of dispersion is rather valuable, since it is easy to compute and has a simple meaning, being one-half of the interquartile range, which includes one-half the items of the distribution. The greater stability of the items toward the center of a distribution makes the quartile deviation a better measure of dispersion than is the range; but those measures which depend upon the value of every item in the distribution, the average deviation and the standard deviation, are better yet.

Average (Mean) Deviation. The average (mean) deviation is computed by noting the difference between the median and each individual item, totaling these differences (disregarding signs), and dividing their sum by the number of items; it is simply an average of the deviations, disregarding signs. When grouped data are used, the difference between the mid-point of each class interval and the median is multiplied by the number of items in that class interval, the resulting products for all class intervals are totaled, and the sum is divided by the number of items in the distribution. A sample problem is worked out in Fig. 34, using the wage data of The Thom Pottery, Inc. The average deviation, it is seen, is harder to compute than the range or interquartile deviation, but simpler than the standard deviation.

Standard Deviation. The standard deviation is now computed by squaring the individual variations from the mean, totaling, dividing by the number of items, and taking the square root of the resulting average squared deviation. This method of calculation gives the standard deviation the name "root-mean-square deviation," since it is the square root of the arithmetic mean of the squares of the individual deviations from the mean. See Fig. 35.

The normal distribution has been rather thoroughly analyzed in terms of the standard deviation by reputable statisticians, and their conclusions prove that, in a normal distribution, over two-thirds of the cases will lie within one standard deviation on either side of the mean, 95 per cent will lie within a range of two standard deviations on either side of the mean, and less than 1 per cent will lie more than three standard deviations from the mean on either side. As the dis-

COMPUTATION OF STANDARD DEVIATION OF WEEKLY EARNINGS

Employees of The Thom Pottery, Inc.

Week Ending May 14, 1934

| Weekly Earnings in Dollars | Mid-point of Class | Frequency | Product | Deviations from Mean | Deviations Squared | Frequency | Product |
|----------------------------|--------------------|-----------|---------|----------------------|--------------------|-----------|----------|
| 9.00-10.99 | 10 | 2 | 20 | -12.46 | 155.25 | 2 | 310.50 |
| 11.00-12.99 | 12 | 5 | 60 | -10.46 | 109.41 | 5 | 547.05 |
| 13.00-14.99 | 14 | 6 | 84 | - 8.46 | 71.57 | 6 | 429.42 |
| 15.00-16.99 | 16 | 8 | 128 | - 6.46 | 41.73 | 8 | 333.84 |
| 17.00-18.99 | 18 | 11 | 198 | - 4.46 | 19.89 | 11 | 218.79 |
| 19.00-20.99 | 20 | 23 | 460 | - 2.46 | 6.05 | 23 | 139.15 |
| 21.00-22.99 | 22 | 28 | 616 | - 0.46 | 0.21 | 28 | 5.88 |
| 23.00-24.99 | 24 | 22 | 528 | 1.54 | 2.37 | 22 | 52.14 |
| 25.00-26.99 | 26 | 17 | 442 | 3.54 | 12.53 | 17 | 213.01 |
| 27.00-28.99 | 28 | 13 | 364 | 5.54 | 30.69 | 13 | 398.97 |
| 29.00-30.99 | 30 | 6 | 180 | 7.54 | 56.85 | 6 | 341.10 |
| 31.00-32.99 | 32 | 4 | 128 | 9.54 | 91.01 | 4 | 364.04 |
| 33.00-34.99 | 34 | 3 | 102 | 11.54 | 133.17 | 3 | 399.51 |
| 35.00-36.99 | 36 | 1 | 36 | 13.54 | 183.33 | 1 | 183.33 |
| Totals | | 149 | 3,346 | | | 149 | 3,936.83 |

$3,346 \div 149 = \$22.456$, the arithmetic mean of wages in the pottery, which we shall round to \$22.46.

The sum of the squared deviations from the mean, 3,936.83, divided by the number of items, 149, gives 26.4216 as the square of the standard deviation. The square root of this number, \$5.14, is the standard deviation.

Fig. 35. Computation of the Standard Deviation

tribution departs from normality, the standard deviation becomes a less accurate definer of the ranges within which different percentages of the cases lie.

The standard deviation is the most useful measure of dispersion for several reasons: First, it takes into consideration every item in

the distribution; second, the squaring process takes account of signs of differences and is thus mathematically impeccable; third, it may be treated algebraically; and fourth, the normal curve has been analyzed in terms of the standard deviation. On the other hand, the squaring of differences may give too much weight to the extreme items—a defect which is not present in the average deviation.

CHAPTER VI

USE OF TIME SERIES IN BUSINESS

Importance of Time Series Analysis. One of the most important types of comparisons, as already explained, is the comparison of the same phenomena at different points of time. In Chapter I we noted the importance of statistical data as bases for sound judgments upon which to act in the fields of business and investment. In Chapter III we outlined the leading methods for the graphic presentation of time series, the arithmetic and logarithmic time curves. In Chapter IV we discussed briefly one type of time series, the historical distribution. However, the discussion of the usual method of analysis for chronological changes in various series of economic and business data has been postponed till this part.

Our economic order, contrary to the simplifying assumptions of the classical economists, is not static but exceedingly dynamic, with its component parts changing from hour to hour, day to day, and year to year. Apparently there is no such thing as perfect economic equilibrium, so changes in prices, in volume of trade, in demand for specific commodities, in interest rates, and in many other economic phenomena become matters of tremendous significance to the business man or investor, because it is only by correctly anticipating changes in these phenomena that he can make a profit and avoid a loss.

It is a popular saying that the foundations of most great fortunes have been laid in periods of depression, because the astute founder of the later "house" correctly anticipated the future course of events and acted accordingly. It is equally true that fortunes may be wiped out almost overnight, as many of them were in 1929, if their possessors misjudge the future. The suddenness and magnitude of many business changes constitute such perils that business organizations everywhere are spending a good deal of money on sta-

tistical research for the purpose of catching a glimpse of the proverbial shadow of coming events, in order that they may shape their business policies accordingly.

Component Factors in Time Series. The first step in a study of time series is a recognition that chronological changes are the result of many diverse and interacting forces of varying intensity, some cancelling each other and some combining to bring about pronounced changes in the series being studied. While the forces themselves cannot be isolated and measured, the time series can be broken down into its component parts, each of which is the resultant of many forces, and the probable future course of each part of the time series can then be predicted.

The customary analysis of a time series runs somewhat as follows: Upon a long-term trend is superimposed an irregular cyclical movement, characterized by alternate periods of prosperity and depression; these fluctuations are supplemented by random movements as the result of special and non-recurrent events, such as floods, wars, and revolutionary inventions; the final series is completed by adding short-term periodic swings due to weather, holidays, and even days of the week—such short-term fluctuations are known as seasonal variations. We have, then, four separate types of change:

- | | |
|-------------------------|---------------------|
| 1. Basic secular trends | 3. Business cycles |
| 2. Seasonal variations | 4. Random movements |

Basic Trends. The word "trend" implies a long-term tendency from which deviations may occur but which, nevertheless, is always present in the phenomena being discussed. This trend may be upward or downward, constant in absolute amount of change from year to year or constant in rate of change; or it may not be quite so simple as that but may display irregular reactions to the forces shaping it. In this country, the most usual trend in business series is upward, due to our increase in population, enlarged markets, and technological advances. The American slogan of "bigger and better" is but a reflection of the history of our country. In other words, an upward trend may be due to natural growth. However, downward trends are not unknown, because industries whose products have been superseded by new inventions display such trends of production.

Cases in point are the carriage, phonograph, and kerosene lamp industries. When a series possesses a perfectly horizontal trend, we say that no trend is present, since the trend has no effect upon the series.

While trends are by definition fairly stable, it must not be inferred that they are absolutely unchanging. They are shaped by forces which may change, so reversals of direction do occur at times. For instance, the trend of wholesale prices in the United States was downward from 1870 to 1895, when it turned upward and continued in its new direction until 1920. However, a trend does not change frequently, because it reflects the long-term tendency, not short-term changes.

Measuring Trends. The first step in analyzing any time series consists in charting the data. Any pronounced upward or downward trend will be readily seen, and the general nature of the trend, as linear or curved, can be determined. Once the data have been charted, a trend may be fitted by one of the following methods:

1. A trend line may be drawn in freehand, though this is not a very accurate method except in the hands of an expert.
2. The average of several preceding and succeeding years may be taken as the trend value for each year. This method is called that of moving averages.
3. A mathematical curve of the proper type may be fitted by rather involved mathematical methods, the most popular of which is called "the method of least squares."

Fig. 36 shows a trend fitted by the third method to annual data on the production of anthracite coal.

Seasonal Variations. One of the most regularly periodic and most familiar of all types of changes is seasonal variation. Changes in sales volume, production, and prices, recurring at regular intervals of a year, a month, or a week, may be due to weather conditions, holidays, or buying habits. All of these regular fluctuations of one year or less in length are lumped together under the title of seasonal variations. Some seasonal variations are not strictly regular; the most outstanding example is the variable location of Easter, with its accompanying effect upon the sale of spring clothes. Different

weather conditions from year to year may cause seasonal changes of different magnitudes and upon different dates, but a rather high degree of regularity is generally evidenced by these changes. Hens lay lots of eggs in the spring, fewer eggs in the summer, very few in the autumn, and pick up their task again in the late winter; the result is a series of corresponding changes in the price of eggs in our

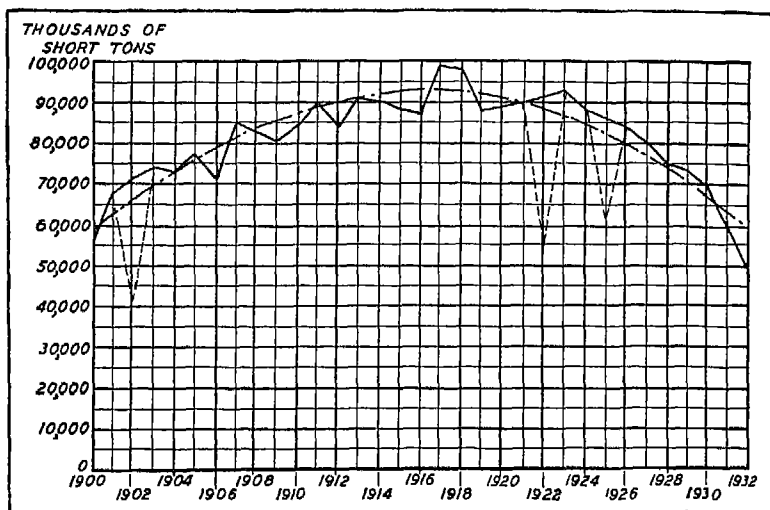
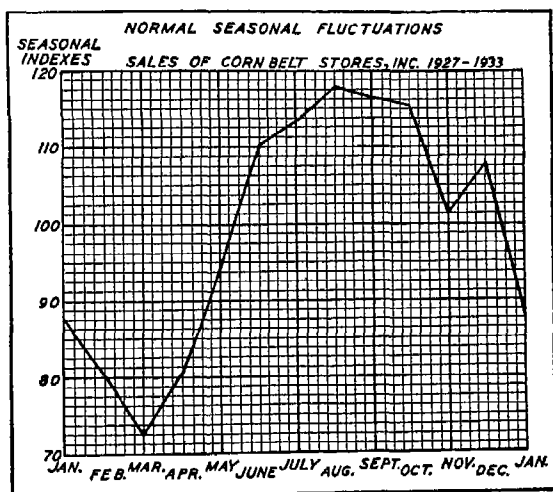
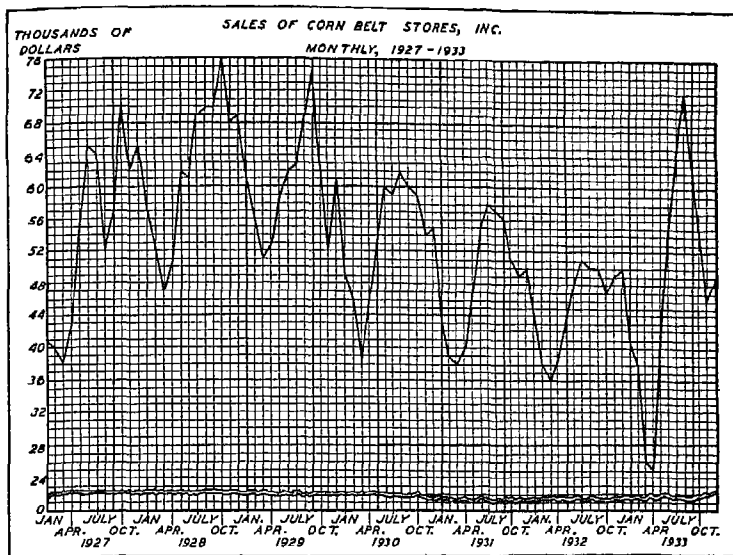


Fig 36. Trend Fitted to Annual Data on the Production of Anthracite Coal

cities, modified somewhat by the general use of cold storage facilities to equalize the supply as between seasons. Automobile sales are heavy in the spring when the new models are just out, decline late in the summer, and almost reach a standstill just before the announcement of the next year's models.

Measuring Seasonal Variations. Seasonal changes, because of their comparative regularity, lend themselves readily to statistical measurement, and a knowledge of them is almost indispensable for the effective control of any type of manufacturing or merchandising enterprise. There are several different methods of calculating seasonal variations, but they are all averaging processes which seek to find each month's normal percentage of the year's average or total.



A series possessing distinct seasonal variations is charted in Fig. 37, and the normal seasonal variation alone is shown in Fig. 38.

Business Cycles. The alternate periods of prosperity and depression, of expansion and liquidation, which have characterized our economic order for the last half-century or more, have been dubbed business cycles. The implication of the word "cycle" is that the same phases occur over and over again in the same sequence. This has been true, although the duration and magnitude of each phase may differ from cycle to cycle. Secular trend is fairly constant, and seasonal variations are usually very regular, and therefore it is the business cycle which presents the gravest problem to the business man who must needs turn prophet if he is to act wisely. Unlike seasonal changes, the business cycle is not truly periodic, for its length varies from three years upward. The most popular method of forecasting is based upon a study of cycles in the past, emphasizing the causes of each and applying the knowledge thus gained to an analysis of the current situation with a prognosis as to the future. The sequence of different types of changes is emphasized by some students of business cycles, while others prefer to evaluate each situation by itself, balancing counteracting forces against each other. In any case, the isolation of cyclical fluctuations is desirable for the purpose of testing economic theories and for practical forecasting in individual situations.

Measuring Business Cycles. The usual order of analysis of time series is as follows. The trend is computed, and all actual values are stated as percentages of the trend. Seasonal indexes are next calculated, and the "normal" figure for each month is secured by combining the seasonal and trend values. This second step is, of course, unnecessary if the data are given at annual intervals rather than monthly or weekly. The cycle is then computed by comparing each actual figure with the "normal" figure for that date. Generally this comparison is made by dividing the actual figure by the normal figure, giving a percentage of normal. Fig. 39 is a sample cycle chart.

Random Movements. Different from these irregular cyclical fluctuations are the so-called random movements caused by non-recurrent events of a non-business order, such as droughts, fires,

floods, earthquakes, wars, and revolutions. Some of these random influences may be very great, such as the prolonged drought of 1934, which covered a good share of the United States; many others are of lesser importance. The fact that the cycle itself may be of varying

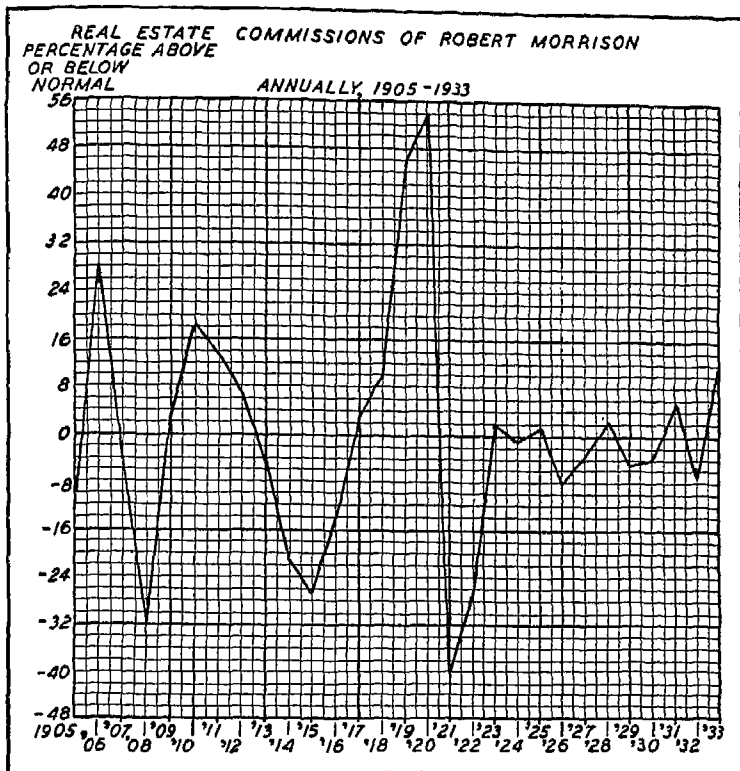


Fig. 39. Cycles (Percentage Deviations from Normal) in the Commissions of Robert Morrison, a Real Estate Man in a Small Corn Belt City

length and magnitude makes it practically impossible to segregate random movements from cyclical fluctuations, so they are generally studied together; their composite is called, perhaps erroneously, the cycle.

It is a truism that the effect of any catastrophe, and hence the magnitude of the resulting random movement, decreases as the area

covered by our data is enlarged. For example, the frequent floods in Dayton, Ohio, have been very important so far as their effect upon the business done by the merchants of Dayton is concerned, but they have had an exceedingly trivial effect upon the business of the United States as a whole. The same external event may cause a downward random movement in one series and an upward random movement in some other series; or it may bring about upward or downward movements alone.

Forecasting. In attempting to predict the future course of any class of phenomena, it is safe to assume, in the absence of any overwhelming evidence to the contrary, that the present trend will continue for at least another year, so the trend may be projected. The same is true of the seasonal element. The projected trend should therefore be adjusted for the probable seasonal variation. Finally, in the light of past cycles and with due consideration for all current conditions, some attempt at predicting the cyclical values for the next year should be made; a final adjustment of the projected trend for the cyclical element leaves the forecaster with his forecast for the next year.

CHAPTER VII

INDEX NUMBERS

Purpose and Use of Index Numbers. It is often desirable to obtain a composite figure representative of the level of prices, the volume of sales, or some other group of phenomena, either for a very broad field or for a more restricted purpose, both as to area and series considered. A study of several individual time series, many of which evidence conflicting movements at any given time, leaves one perplexed and confused as to the general condition of prices, sales, or whatever other phenomena are being considered. It has already been shown that the analysis of frequency distributions is directed toward the simplification of interpretation through the determination of one figure as representative of all the items in the distribution; in very much the same manner, pre-digested business information is supplied to the man who needs it in the form of index numbers—wherein one figure is representative of many facts.

Types of Index Numbers. There are two general types of index numbers—aggregates of actual quantities and averages of percentage relatives. Either type may be used for any kind of phenomena—such as prices, wages, exports, etc.—and the constituent series may be given equal weights or weighted according to their importance.

Selecting the Base Period. One of the most important decisions which must be made, no matter what type of index number is to be constructed, concerns the selection of the base period—that period of time with which all other periods are to be compared. Generally, it is best to choose some time when business was neither unduly depressed nor abnormally inflated—a period of “normalcy.” It may be a year, a month, a day, or any other unit in keeping with the intervals of time at which the phenomena are measured. Either one period or an average of several may be used as the base. Earlier

index numbers were based on the year 1913; but the bases in most common use at present are probably 1926, 1928, and the average of 1923 to 1925. If progress or decline since a certain time is important, that time should be used as the base.

Percentage Relatives. A percentage relative is the price, production, or other measure of a phenomenon expressed as a percentage of that phenomenon's price, production, or other measure during the base period. If sugar cost \$5.00 per cwt. last year and \$5.75 per cwt. this year, the percentage relative of the price of sugar, using last year as the base, is $\frac{5.75}{5.00} \times 100$, or 115. If the price drops to \$4.75 per cwt. next year, the percentage relative will drop to $\frac{4.75}{5.00} \times 100$, or 95. Prices for any given points of time may be expressed as percentages of the price at some fixed point of time chosen as the base, and the resulting percentages are known as percentage relatives. Sometimes they are called index numbers; but it is much better terminology to reserve the use of the term "index number" for figures representing a combination of two or more series.

Problem of Weighting. All series are not of the same importance, and it is therefore not accurate to give them equal weights in the final result. Coal is a more important item in the national economy than is garlic, so changes in the price of coal are more important than changes in the price of garlic. Since price indexes are the most common of all indexes, we shall restrict the discussion to this single type of index; but the same principles are applicable in other fields. In order to give the price of each commodity the proper amount of influence on the index, simple prices should be weighted by the quantities of each commodity sold, and price relatives by the values of the commodities. The value of a commodity is found by multiplying the price by the quantity. Generally, the same weights are used throughout the term of the index; these weights are determined by the base-year quantities or values. It is possible, however, if the necessary data are readily available, to use given-year quantities or values instead.

Aggregative Index Numbers. The unweighted aggregative index number is constructed by merely totaling the prices of the commodities for the base period and also for the given period and

| Commodities | Units of Quotation | 1926 Prices | 1930 PRICES | | |
|--------------|--------------------|-------------|-------------|-----------|----------|
| | | | August | September | October |
| Cotton..... | Pound | \$0.170 | \$0.117 | \$0.107 | \$0.105 |
| Hides..... | Pound | .140 | .136 | .146 | .133 |
| Hogs..... | Cwt. | 13.115 | 10.413 | 10.635 | 9.706 |
| Sugar..... | Pound | .043 | .032 | .031 | .033 |
| Wheat..... | Bushel | 1.542 | .898 | .873 | .853 |
| Wool..... | Pound | .457 | .290 | .290 | .290 |
| Totals..... | | \$15.467 | \$11.886 | \$12.082 | \$11.120 |
| Indexes..... | | 100.00 | 76.85 | 78.11 | 71.90 |

Fig 40 Computation of Unweighted Aggregative Index Numbers

| Commodities | Thousands of Units Traded | 1926 Prices | Total Values at 1926 Prices (Thousands of \$) | TOTAL VALUES AT 1930* PRICES (THOUSANDS OF \$) | | |
|-------------|---------------------------|-------------|-----------------------------------------------|------------------------------------------------|-----------|-----------|
| | | | | August | September | October |
| Cotton..... | 6,629,267 | \$0.170 | 1,126,975 | 775,624 | 709,332 | 696,073 |
| Hides..... | 1,330,230 | .140 | 186,232 | 180,911 | 194,214 | 176,921 |
| Hogs..... | 123,305 | 13.115 | 1,617,145 | 1,283,975 | 1,311,349 | 1,196,798 |
| Sugar..... | 10,360,669 | .043 | 445,509 | 331,541 | 321,181 | 341,902 |
| Wheat..... | 628,711 | 1.542 | 969,472 | 564,582 | 548,865 | 536,290 |
| Wool..... | 426,910 | .457 | 195,098 | 123,804 | 123,804 | 123,804 |
| Totals..... | | | 4,540,431 | 3,260,437 | 3,208,745 | 3,071,788 |
| Indexes.... | | | 100.00 | 71.81 | 70.67 | 67.65 |

*Arrived at by multiplying the number of units traded by the 1930 prices, shown above in Fig. 40.

Fig. 41. Computation of Weighted Aggregative Index Numbers (Using same Data as Fig 40)

dividing the given-period total by the base-period total. A form of illogical weighting is really present here, since the commodities whose units are large are influencing the index more than those whose units are small. For example, the price per ton of coal has much more weight than the price per pound of sugar.

A rational weighting system is used in the so-called weighted aggregative index number; under this system, the quantities of the commodities actually sold are used as weights. The price of each

commodity is multiplied by its quantity to give its value. The values of all of the commodities are totaled for each year. Then the given-year total is divided by the base-year total to give the index number. The computation of these two index numbers is illustrated in Figs. 40 and 41.

Averages of Price Relatives. The other common index numbers are averages, either weighted or unweighted, of individual percentage relatives. The type of average most often used is the arithmetic mean. The unweighted arithmetic mean of price relatives is found by merely totaling the individual price relatives and dividing by the number of price relatives. The weighted arithmetic mean of price relatives is found by multiplying the price relative for each commodity by the value of that commodity, summing the products, and dividing by the total value of all the commodities. The value of each commodity is found by multiplying the base-year quantity by the base-year price. Sample computations of these two types of indexes are shown in Figs. 42 and 43.

Evaluation of Different Index Numbers. Weighted index numbers are superior to unweighted index numbers, for reasons already discussed. The weighted aggregative and the weighted arithmetic mean of price relatives produce the same results, but the former is more useful because of its greater ease of computation.

Uses of Index Numbers. Index numbers are used to present a simplified picture of diverse changes in a specific or general field of phenomena. Their most universally recognized uses are probably in the fields of wholesale prices, retail prices, and cost of living. (An index number based upon the prices and quantities of retail goods entering into the budget of the average laboring family is known as a "cost of living" index.) There are index numbers based on the prices of small groups of commodities as well as index numbers of prices of a more general nature. An ever-increasing number of fields are being entered by index numbers, so that not only prices but industrial production, factory employment, factory pay rolls, automobile production, carloadings, and a multitude of other business phenomena are yielding themselves to the simplifying powers of index numbers.

1930 Percentage Relatives (1926 base)

| Commodity | August | September | October |
|--------------|--------|-----------|---------|
| Cotton..... | 68.82 | 62.94 | 61.76 |
| Hides..... | 97.14 | 104.29 | 95.00 |
| Hogs..... | 79.40 | 81.09 | 74.01 |
| Sugar..... | 74.42 | 72.09 | 76.74 |
| Wheat..... | 58.24 | 56.61 | 55.32 |
| Wool..... | 63.46 | 63.46 | 63.46 |
| Totals..... | 441.48 | 440.48 | 426.29 |
| Indexes..... | 73.58 | 73.41 | 71.05 |

Fig. 42. Computation of Unweighted Arithmetic Means of Price Relatives (Using Same Data as Figs. 40 and 41)

| Commodity | Weights* Assigned | WEIGHTS X RELATIVES (1930) | | |
|--------------|----------------------|----------------------------|-----------|-----------|
| | | August | September | October |
| Cotton..... | 11.1 | 763.902 | 698.634 | 685.536 |
| Hides..... | 1.8 | 174.852 | 187.722 | 171.000 |
| Hogs..... | 16.0 | 1,270.400 | 1,297.440 | 1,184.160 |
| Sugar..... | 4.4 | 327.448 | 317.196 | 337.656 |
| Wheat..... | 9.6 | 559.008 | 543.456 | 531.072 |
| Wool..... | 1.9 | 120.574 | 120.574 | 120.574 |
| Totals..... | 44.8 | 3,216.184 | 3,165.022 | 3,029.998 |
| Indexes..... | | 71.79 | 70.65 | 67.63 |

*These weights are based on the values of the commodities in 1926.

Fig. 43. Computation of Weighted Arithmetic Means of Price Relatives (Using Same Data as Figs. 40, 41, and 42)

Probably the greatest value of index numbers lies in the fact that they make forecasting easier. This is the use usually made of them. Another function which is becoming increasingly important is that of furnishing a factual basis for the control of currency. While no index number as yet developed furnishes a perfect measure of the price level, the approximations which may be attained serve as guides for the raising and lowering of rediscount rates and the expansion and contraction of the circulating medium.

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